

**CLASS 338, ELECTRICAL RESISTORS****SECTION I - CLASS DEFINITION****GENERAL STATEMENT OF THE CLASS SUBJECT MATTER:**

A. This class includes electrical resistors as above defined with solid, granular, or liquid resistance elements. These resistors may be either fixed or variable in resistance value, examples of the latter being rheostats and potentiometers. Semiconductors are included if limited by claimed subject matter to resistance properties, such as exists in photoconductive and thermistor type resistors. Excluded are conductors and insulators, which while including a resistive characteristic have other predominating characteristics.

B. Included also are resistors with perfecting structure not elsewhere classified such as resistors whose resistance value is temperature compensated, or resistors mounted on wheels or on a vehicle, resistors with heat dissipating projections, or with cooling gas or liquid circulation, or with heat storing, or with inductance or capacity reducing, or with electrical shields, or with a cleaner or a setting indicator in a mechanically variable resistor, or with a casing or housing, or with protecting structure spaced from the element, or with mounting or supporting means.

C. Included also are resistors combined with or incorporated in other structure not elsewhere classifiable, such as resistors with certain diverse nonelectrical devices, for example, mechanical or chemical; or resistors in, on, or with certain electrical devices such as a lamp socket or lamp base, or an electric switch, or a coaxial line or wave guide, or a detachable electrical connector.

D. Included also are resistors constructed as by shape or from material to change their resistance value particularly well in response to a particular condition or change in a particular condition such as current and/or voltage, as for example nonlinear and negative resistors; or ambient temperature; or a magnetic field; or gas, vapor, or moisture; or resistors of the strain gauge or photoconductive type. Included also are resistors usually of the mechanically variable type together with a condition sensing actuator which changes the mechanical adjustment of the resistor in response to a condition or a change in condition. Examples of such actuators are a magnetic compass, a float, a piston, a Bourdon tube, a bellows or capsule, a diaphragm, a gravity stabilized or inertia type actuator, or a force sensing actuator.

E. Subcombinations and components of resistors not otherwise classifiable, such as resistance element cores and frames, resistance elements of particular shape or dimensions, and movable contact structures for variable resistors.

**SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

Certain devices, at least quasi-resistive in character, are not classified here. Electric space discharge devices which may exhibit a resistance characteristic between terminals are classified elsewhere. Numerous different types of active solid-state devices, e.g., semiconductor, devices or components whose electrical resistance varies nonlinearly due to the movement of charge carriers - electrons or holes - which undergo energy level changes within the material (as contrasted with the passive or pure resistors found in Class 338) are classified elsewhere. Negative resistors of the active element type are classified elsewhere. Resistors specific to telephone use, including those of the microphone, its electrodes, and granules are classified elsewhere. (See References to Other Classes, below.)

**(1) PLURAL RESISTORS AS DEFINED IN THE CLASS DEFINITION**

Two or more mechanically or electrically related resistors are classified here as a residual home. For plural photoconductive resistors; plural separate diverse resistors; plural mechanically adjustable resistors; plural incased, embedded, or housed resistors; and for plural supported resistors see Subclass References to the Current Class, below. Regulation systems including a plurality of resistors are classified elsewhere. (See References to Other Classes, below.)

**(2) RESISTORS COMBINED WITH OR INCORPORATED IN OTHER DEVICES:**

As stated in the Class Definition, E, above, this class includes resistors combined with or incorporated in other structure when not elsewhere classifiable. For resistors with a restricted type of heat reflector; for a resistor with a diverse nonelectrical device, e.g., mechanical or chemical; for resistors in or on a lamp socket or base; for a resistor with a switch; for a resistor in a coaxial line or wave guide; and for a resistor in a detachable electrical connector see Subclass References to the Current Class, below.

The combination of the resistor with or in other structure is very common. A partial list of the classes and subclasses including this combination is given in References To Other Classes, below, referenced to this section.

### (3) RESISTANCE COMPONENTS AND SUBCOMBINATIONS:

As stated in the Class Definition, E, above, this class includes subcombinations and components of resistors not otherwise classifiable. For contact structure adapted to move along the length of a resistance element in a mechanically variable resistor and making an electrical connection with the element; resistance element cores and frames; and for resistance elements and bases of particular configuration and/or dimension see Subclass References to the Current Class, below. In References to Other Classes, below, see the references to this section for the classification of the more common subject matter which may constitute a part or subcombination or a resistor.

### (4) DEVICES SIMULATING RESISTORS:

Dissipating terminations for long lines; artificial lines; negative resistance networks of the active element type; and for resonators of the distributed parameter type are classified elsewhere. (See References to Other Classes, below.)

### (5) METHODS OF AND APPARATUS FOR MAKING RESISTORS:

This class does not provide for methods of making resistors. This subject matter is classified elsewhere, (A) when involving a metal working process; or (B) when involving a metal working process combined with a nonmetal working process, if not otherwise classifiable; or (C) when the process is not otherwise classifiable. See References to Other Classes, below, for a field of search for methods of making resistors. Apparatus for assembling electrical resistors are classified elsewhere. Methods and apparatus for making a resistor coil which is a composite of a core and a winding thereabout are classified elsewhere. (See References to Other Classes, below.)

### (6) MEASURING AND TESTING RESISTORS:

This class does not provide for either methods of or apparatus for measuring and testing resistors. If the measuring or testing involves determining the resistance

or conductivity of the resistor, classification is elsewhere. If the measuring or testing is of a mechanical nature or not otherwise classified, classification is elsewhere. See elsewhere for a field of search for measuring and testing. (See References to Other Classes, below.)

### (7) ELECTRICAL RESISTANCE HEATERS:

Resistors classified in Class 338 in performing their current impeding function produce heat, as do the resistance heaters classified in Class 219, Electric Heating. In the resistors classified in Class 338 the heat produced is incidental or undesired; or is utilized internally only to modify in some manner, as in a thermistor, the temperature of the resistor to in turn modify the current impeding characteristic of the resistor. In the resistance heaters classified in Class 219 the heat produced is put to some external use as opposed to mere dissipation or internal heating of the resistance element. Thus, in general, the resistance heaters in Class 219 include significant structure, shape or arrangement to produce and convert the heat to a useful purpose, as to direct or distribute the heat in a particular manner. The following paragraphs cover the more common situations arising between these two classes.

(A) The mere designation of the claimed structure as a heater or heater element, such a toaster or a blanket, or the broad recitation in the claim of intended use or adaption for heating purposes or for use with structure to be heated is not sufficient for classification in Class 219.

(B) The recitation of the device to be heated in combination with the heating resistor is classified in Class 219 rather than in Class 338. Likewise classification is in Class 219 when the resistor is shaped or otherwise adapted to conform to the structure to be heated to facilitate the transfer of heat to this structure, such shape or adaption not having general utility.

(C) The combination of a resistor and a casing of good heat conducting material is classified in Class 338. For classification in Class 219 as indicated above the heating resistor with its casing must be adapted as by shape to transfer, distribute, or direct the heat in a particular manner or pattern.

(D) Resistors whose elements are formed as fabrics or pads are classified in Class 338. However, if the fabric or pad is shaped or dimensioned to constitute a particular heating device, such as an article of clothing or a blanket classification is in Class 219. Mere fabrics

including metal of resistance material, as when the resistance terminals are not claimed is classified elsewhere.

(E) The combination of a resistor and structure to facilitate the external heating effect of the resistor, such as a reflector, is classified in Class 219. Likewise Class 219 includes those resistors which are shaped to produce a desired heating effect or distribution. Resistors including reflectors which direct heat on the resistance element are classified herein (see Subclass References to the Current Class, below).

(F) A few structures such as liquid resistance heaters and liquid cooled resistors, may be considered either resistance heaters for Class 219 or resistors for Class 338. These structures are classified in accordance with the recited use and background.

#### (8) RESISTANCE FURNACES:

Electric furnaces combined with the heating resistors, as a resistor with the furnace wall; or includes resistors which are formed to constitute at least part of a furnace, as being hollow to form a muffle or being recessed to form a crucible; or includes resistors which are peculiar to an electric furnace, as having the shape of the furnace, such shape having no significance elsewhere are classified elsewhere.

#### (9) RESISTORS FORMED BY COATING OR LAMINATING:

Processes of forming electrical products when formed by a coating process, per se, and when formed by a laminating step, per se, are classified elsewhere. A plurality of layers of laminated or coated material, one layer being a resistance element and the other layer or layers being terminals, no particular structure being recited, but usually only particular materials, are classified elsewhere, even though the terminals and resistance elements are claimed by such names. See this class (338) for a resistor whose element is coated on a base and for resistors with terminals coated on, together with significant resistance structure such as a particular shape. (See Subclass References to the Current Class and References to Other Classes, below.)

#### (10) CONDUITS, CABLES, AND CONDUCTORS WITH RESISTIVE MATERIAL:

Conduits, cables, and conductors where the conducting part is a resistor or a helical resistor are classified elsewhere. Such claimed terms as resistance, resistance element, helical resistance, coil resistance, or a terminal

at one end of a sheathed resistor do not preclude classification elsewhere. However, when the conducting element in such conduits, cables, or conductors is recited as being of a material which is essentially resistive such as iron, classification is in Class 338. Likewise when significant resistance structure or configuration such as the resistor having a zigzag pattern, or being wound on a core is recited, classification is in Class 338. Conduits, cables or conductors with a nominally resistive or helically resistive element together with end structure and cables whose conducting elements are nominally resistive or helically resistive are classified elsewhere. The claimed combination of a resistor broadly with end structure or terminals at each end is classified in Class 338.

#### (11) ELECTRICAL CONNECTORS WITH RESISTIVE CONDUCTORS:

The combination of an electrical connector and lead conductor, the lead conductor being nominally claimed as being resistive, is classified elsewhere. If the lead conductor is recited as being of significant resistor structure or material, such as a zigzag shape or of iron material, classification is in Class 338. The combination of a nominally recited resistive conductor with an electrical connector at each end is classified in this class (338). The inclusion of additional connectors cooperable with the connector or connectors on the resistance element does not preclude classification in Class 338. (See Subclass References to the Current Class and References to Other Classes, below.)

#### (12) SEMICONDUCTORS:

Semiconductors are classified in Class 338 if possessing only resistance characteristics. Such semiconductors may be photoconductive or may be of the thermistor type (see Subclass References to the Current Class, below). However, if the semiconductor has other more comprehensive characteristics, classification is elsewhere. Numerous different types of active solid-state devices, e.g., semiconductor, devices or components whose electrical resistance varies nonlinearly due to the movement of charge carriers - electrons or holes - which undergo energy level changes within the material (as contrasted with the passive or pure resistors found in Class 338) elsewhere. (See References to Other Classes, below.)

#### (13) MEASURING AND TESTING DEVICES WITH VARIABLE RESISTORS:

This Class 338 provides generally for resistors which

are shaped or chemically constituted to change their resistance value in response to a condition or change in condition, or for mechanically variable resistors combined with a condition sensing actuator. However, when additional structure is claimed for indicating the change in resistance value as a meter for measuring the current passing through the resistance element, or a Wheatstone bridge arrangement including the resistance element as one of the arms, the combination is classified as a measuring or testing device. Distance measuring devices and gauges, namely, a condition responsive resistor and an indicating device or circuit are classified elsewhere; moisture content and stress and strain measuring devices, dynamometers, liquid level or depth gauges, hygrometers, and fluid pressure gauges including this combination are classified elsewhere; a thermometer including this combination is classified elsewhere; and time and/or speed measuring devices including this combination are classified elsewhere. See References to Other Classes, below. See also the reference to Class 338 in References to Other Classes in the Class Definitions of Class 73.

#### (14) RESISTANCE COMPONENTS AND SUBCOMBINATIONS:

This class (338) provides for resistance components and subcombinations which are not otherwise classifiable. This class (338) includes resistance cores or frames including a base usually of insulating material on which a resistance element may be wound or otherwise strung. As between this class (338) and the insulators of special application in other classes, this class (338) includes insulators which are constituent parts of the resistor as to have a resistance element wound or strung thereon. However, an insulator for supporting a resistance wire at one point thereon, this wire being strung in space in the manner of an aerial conductor is not classified here, but elsewhere. Resistive cable supports and brackets are classified elsewhere.

Boxes and housings which may constitute resistor housings which are limited by claimed structure to electrical use and not otherwise classifiable are classified elsewhere.

### SECTION III - SUBCLASS REFERENCES TO THE CURRENT CLASS

SEE OR SEARCH THIS CLASS, SUBCLASS:

2+, and 13+, for resistors which are shaped or chemically constituted to change their resistance value in response to a condition or

change in condition, or for mechanically variable resistors combined with a condition sensing actuator.

- 11, for resistors with a restricted type of heat reflector and for resistors including reflectors which direct heat on the resistance element.
- 13+, for subcombinations of devices and gauges, no indicator being claimed; but only claiming the resistor responsive to a condition or with a condition sensing actuator.
- 15+, for photoconductive semiconductors.
- 17, for plural photoconductive resistors.
- 22+, for thermistor type semiconductors.
- 48, for plural separate diverse resistors.
- 67, for a resistor with a diverse nonelectrical device, e.g., mechanical or chemical.
- 70+, and 219, for resistors in or on a lamp socket or base.
- 76, and 128+ for plural mechanically adjustable resistors.
- 200+, and 215, for a resistor with a switch.
- 202, for contact structure adapted to move along the length of a resistance element in a mechanically variable resistor and making an electrical connection with the element.
- 215, for resistance elements and bases of particular configuration and/or dimension.
- 216, for a resistor in a coaxial line or wave guide.
- 220, for a resistor in a detachable electrical connector.
- 235, 239, and 260+ for plural incased, embedded, or housed resistors.
- 308+, for a resistor whose element is coated on a base.
- 309, and 327, for resistors with terminals coated on, together with significant resistance structure such as a particular shape.
- 319, and 320 for plural supported resistors.
- 321, for resistance element cores and frames.
- 321, for resistance cores or frames including a base usually of insulating material on which a resistance element may be wound or otherwise strung.
- 322+, for the claimed combination of a resistor broadly with end structure or terminals at each end.
- 322+, for combination of a nominally recited resistive conductor with an electrical connector at each end.

### SECTION IV - REFERENCES TO OTHER CLASSES

## SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 610.1+ for methods of making resistors (A) when involving a metal working process; or (B) when involving a metal working process combined with a non-metal working process, if not otherwise classifiable; or (C) when the process is not otherwise classifiable; subclasses 729+ for apparatus for assembling electrical resistor. See the search notes under subclass 610.1+. (See Lines With Other Classes and Within This Class, (5), "Methods Of and Apparatus for Making Resistors," above.)
- 33, Geometrical Instruments, for geometrical instruments which may use an electrical resistor, especially subclasses 125+, for distance determining devices; subclasses 174+, for limit gauges; and subclasses 204+, for direction indicators. (See Lines With Other Classes and Within This Class, (6), "Measuring and Testing Devices With Variable Resistors," above.)
- 33, Geometrical Instruments, especially subclasses 125+ and 174+ for distance measuring devices and gauges which may include a resistor. See this class (338) for subcombinations of such devices and gauges, no indicator being claimed; but only claiming the resistor responsive to a condition or with a condition sensing actuator. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices" and (13), "Measuring and Testing Devices With Variable Resistors.")
- 73, Measuring and Testing, for measuring and testing devices generally, especially subclass 29, for moisture content or vapor pressure gas analysis; subclasses 308 and 453, for float actuated electrical indicators; subclasses 763+ for an electrical stress or strain measuring system; subclasses 862.38+, for push or pull measuring dynamometers; subclass 301, for hydrostatic pressure electrically controlled indicators; subclass 304, for liquid level or depth gauge of the immersible electrode type; subclass 313, for a float actuated electrical controlled indicator; subclass 336.5, for hygrometers with electrical circuits; and subclasses 717+, 723+, and 753+, for fluid pressure gauges of the current generating or modifying type. (See Lines With Other Classes and Within This Class, (6), "Measuring and Testing Resistors," and (7), "Electrical Resistance Heaters," above.)
- 73, Measuring and Testing, especially subclass 29, 73+, 301, 304, 308, 313, 336.5, 453, 719, 725, 734, 746, 750, 763+, and 862.391, for measuring and testing devices such as stress and strain measuring devices, dynamometers, liquid level or depth gauges, hygrometers, and fluid pressure gauges, all of which may include an electrical resistor. See subclasses 2+ and 13+ in this class (338) for subcombinations of such devices, no indicator or circuit arrangement being claimed; but only claiming the resistor responsive to a condition or with a condition sensing actuator. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," and (13), "Measuring and Testing Devices With Variable Resistors.")
- 73, Measuring and Testing, for measuring or testing of a mechanical nature or not otherwise classified. See also the search notes in this Class 73 for a field of search for measuring and testing. (Lines With Other Classes and Within This Class, (6), "Measuring And Testing Resistors.")
- 74, Machine Element or Mechanism, subclasses 10+ for shaft operators of the radio tuner type analogous to variable electrical resistors of the shaft operated type.
- 105, Railway Rolling Stock, subclass 61 for electric railway cars including a controlling resistor.
- 123, Internal-Combustion Engines, subclass 148 for high tension ignition circuits for internal combustion engines which may include a resistor.
- 136, Batteries: Thermoelectric and Photoelectric, subclass 89 for primary batteries of the photoelectric type.
- 137, Fluid Handling, especially subclasses 227+ for tire stem inflation means with a gauge or indicator; and subclasses 786 and 793+ for expandable chamber fluid handling devices of the bellows or capsule type.
- 139, Textiles: Weaving, subclass 425 for woven fabrics including metal which may be resistive.
- 139, Textiles: Weaving, subclass 425 for fabrics including resistive metal. (See Lines With Other Classes and Within This Class, (3), "Resistance Components And Subcombinations")
- 139, Textiles: Weaving, subclass 425, for mere fabrics including metal of resistance material, as when the resistance terminals are not claimed. (See Lines With Other Classes and Within This

- Class, (7), "Electrical Resistance Heaters," (D), above.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 47+ for making and/or joining of electrical conductors of indefinite length.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, for processes of forming electrical products formed by a laminating step, per se. (See Lines With Other Classes and Within This Class, (9) "Resistors Formed by Coating or Laminating".)
- 166, Wells, subclass 60 and 61 for electrical heaters located and used in wells.
- 174, Electricity: Conductors and Insulators, subclasses 3.2+ for anti-inductive electrical conductors; subclasses 17+ and 50+ for boxes and housings limited by claimed structure to electrical use and not otherwise classifiable; subclasses 68.1+ for conduits, cables and conductors generally; and subclass 138 for insulators which may be used with resistors. (See Lines With Other Classes and Within This Class, (10), "Conduits, Cables, and Conductors With Resistive Material," and (14) "Resistance Components And Subcombinations," above.)
- 174, Electricity: Conductors and Insulators, subclasses 74+ for conduits, cables, or conductors together with the end structure at one end of the conduit, cable, or conductor, no significant resistor structure being claimed; subclasses 102+, 110+ and 126.1+ for cables and conductors whose conducting part may be claimed as resistive; and subclass 138 for insulators of special application such as those around or through which resistance wire may be led, the wire not being claimed. The combination of the end structure at both ends of the conduit cable or conductor when the conduit cable or cable is even claimed broadly as a resistor or resistive is not classified in Class 174, but in Class 338. (See Lines With Other Classes and Within This Class, (3), "Resistance Components and Subcombinations" and (10) "Conduits, Cables, and Conductors With Resistive Material," above.)
- 174, Electricity: Conductors and Insulators, for conduits, cables, and conductors where the conducting part is a resistor or a helical resistor. Such claimed terms as resistance, resistance element, helical resistance, coil resistance, or a terminal at one end of a sheathed resistor do not preclude classification in Class 174. (See Lines With Other Classes and Within This Class, (10) "Conduits, Cables, and Conductors With Resistive Material," above.)
- 174, Electricity: Conductors and Insulators, subclass 138 for insulators of special application; also for supporting a resistance wire at one point thereon, this wire being strung in space in the manner of an aerial conductor. See also the Search Notes under subclass 138. (Lines With Other Classes and Within This Class, (14), "Resistance Components and Subcombinations")
- 174, Electricity: Conductors and Insulators, subclasses 74+, for conduits, cables or conductors with a nominally resistive or helically resistive element together with end structure. (See Lines With Other Classes and Within This Class, (10) "Conduits, Cables, and Conductors With Resistive Material," above.)
- 178, Telegraphy, appropriate subclasses, for telegraph systems including resistors.
- 180, Motor Vehicles, subclass 77, for motor vehicles including electric controlling devices which may be resistors.
- 188, Brakes, subclass 86 for fluid and mechanical internal resistance brakes including dashpots.
- 191, Electricity: Transmission to Vehicles, subclasses 45+ for electrical collectors carried by a vehicle or other moving body, and subclasses 53, 56 and 63+ for trolley collectors involving rolling contractors.
- 200, Electricity: Circuit Makers and Breakers, especially subclasses 52+ for switches of special application; subclasses 81+ for fluid pressure operated switches; subclasses 113+ for thermal current operated type switches; and subclass 144 for arc preventing and extinguishing switches which may use a resistor. ( See Lines With Other Classes and Within This Class, (2), "Resistors Combined With Or Incorporated In Other Devices," above.)
- 200, Electricity: Circuit Makers and Breakers, subclass 144 for arc preventing or extinguishing switches including resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 211, Supports: Racks, appropriate subclasses, for supports for a plurality of resistors.
- 216, Etching a Substrate: Processes, subclass 16 for the manufacturing of a resistive element using etching.
- 219, Electric Heating, subclasses 50+ for metal heating with a resistor and subclasses 19+ for

- electrical heaters. (See Lines With Other Classes and Within This Class, (7), "Electrical Resistance Heaters," above, for the lines between Class 219 and 338.)
- 220, Receptacles, subclasses 2.1+ for envelopes used with electric lamps or similar devices; subclasses 3.2+ for outlet or junction box type enclosures; and subclasses 24+ for metallic closures generally.
- 236, Automatic Temperature and Humidity Regulation, appropriate subclasses, for automatic temperature controls which may include resistors, especially the subclasses found under THERMOSTATIC.
- 242, Winding, Tensioning, or Guiding, subclasses 600+ and 118+ for a spool upon which a resistor may be wound, usually for temporary storage, and subclasses 430+ for the method and apparatus, respectively, of winding a resistor coil to form a composite article. (See Lines With Other Classes and Within This Class, (5), "Methods Of and Apparatus for Making Resistors, above.")
- 245, Wire Fabrics and Structure, subclasses 2+ for wire fabrics which may be of resistance material.
- 248, Supports, especially subclasses 49+ provides for resistive cable supports and 200+ for supports and brackets which may be used with resistors, or for the combination of a nominal resistor with support details. (Lines With Other Classes and Within This Class, (14), "Resistance Components and Subcombinations")
- 250, Radiant Energy, subclasses 200+ for photo-cell circuits and apparatus.
- 250, Radiant Energy, appropriate subclasses, for ray energy systems including resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated In Other Devices," above.)
- 252, Compositions, subclasses 500+ for electrically conductive or emissive compositions, which may be resistive; subclass 567 for a web or sheet impregnated with a fluent dielectric; and subclasses 570+ for a fluent dielectric composition, per se.
- 252, Compositions, subclass 62.2 for electrolytes for electrical devices; subclasses 500+ for resistive compositions. (See Lines With Other Classes and Within This Class, (3), "Resistance Components and Subcombinations," above.)
- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes, for numerous different types of active solid-state devices, e.g., semiconductor, devices or components whose electrical resistance varies nonlinearly due to the movement of charge carriers - electrons or holes - which undergo energy level changes within the material. (Lines With Other Classes and Within This Class, above, and also see in Lines With Other Classes and Within This Class, (12), "Semiconductors," above.)
- 307, Electrical Transmission or Interconnection Systems, subclasses 89+ for anti-inductive means to prevent or reduce the coupling between electrical systems; and subclasses 112+ for switching systems which may include a resistor and switch combination.
- 307, Electrical Transmission or Interconnection Systems, appropriate subclasses, for electrical transmission or interconnection systems not elsewhere classified including resistors. (See allLines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 310, Electrical Generator or Motor Structure, subclasses 219+ for rotor type current collectors for dynamoelectric devices.
- 313, Electric Lamp and Discharge Devices, for electric lamp and discharge devices utilizing an envelope enclosing a vacuum or gaseous space; especially subclass 14 for pyro-electric temperature modifier type devices; and subclasses 341+ for filaments or resistance heated electrodes.
- 313, Electric Lamp and Discharge Devices, for electric space discharge devices which may exhibit a resistance characteristic between terminals. (Lines With Other Classes and Within This Class, above.)
- 313, Electric Lamp and Discharge Devices, appropriate subclasses, for electric lamps and discharge devices including resistance heating or heated filaments. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices.")
- 315, Electric Lamp and Discharge Devices: Systems, for electric lamp and discharge device systems which may include a resistor as an element of the system; and especially subclasses 3 through 3.6 and 8-31, for cathode ray tube circuits including resistors; and subclasses 32+ for a discharge device load with a resistor.
- 315, Electric Lamp and Discharge Devices: Systems, especially subclasses 3 through 3.6 and 8-31, for cathode-ray tube circuits including

- resistors; and subclasses 32+ for a discharge device load with a resistor. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 318, Electricity: Motive Power Systems, appropriate subclasses, for electrical motive power systems including the combination of a electric motor controlled by a resistor. See subclass 116 of Class 338 for a mechanically variable resistor actuated by an electric motor.
- 318, Electricity: Motive Power Systems, appropriate subclasses, for electric motor control systems including an electric motor controlled by a resistor. See subclass 116 of this class (338) for a mechanically variable resistor actuated by an electric motor. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 322, Electricity: Single Generator Systems, subclasses 80+ for single generators with a resistance control.
- 323, Electricity: Power Supply or Regulation Systems, for regulation systems including a plurality of resistors. (Lines With Other Classes and Within This Class, (1) "Plural Resistors As Defined in the Class Definition")
- 322, Electricity: Single Generator Systems, especially subclasses 80+ and 97+, for single electric generator systems including resistance control. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 323, Electricity: Power Supply or Regulation Systems, subclasses 293+ for regulation systems including resistors. This class also provides for the combinations of resistors and inductors and/or condensers in voltage regulation systems.
- 323, Electricity: Power Supply or Regulation Systems, subclasses 293+, 352+ and 365+ for regulation systems including resistors. (See Lines With Other Classes and Within This Class, (1), "Plural Resistors As Defined In The Class Definition," and (2), "Resistors Combined With Or Incorporated In Other Devices.")
- 324, Electricity: Measuring and Testing, for methods of or apparatus for measuring and testing resistors. subclasses 62+ for measuring or testing involving determining the resistance or conductivity of the resistor. (Lines With Other Classes and Within This Class, (6), "Measuring and Testing Resistors.")
- 324, Electricity: Measuring and Testing, appropriate subclasses, for electrical measuring and testing devices including resistors. (See Lines With Other Classes and Within This Class, 2, "Resistors Combined With or Incorporated in Other Devices")
- 324, Electricity: Measuring and Testing, subclasses 160+, for time and/or speed measuring devices. (See Lines With Other Classes and Within This Class, (13), "Measuring and Testing Devices With Variable Resistors," above.)
- 327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous circuits which may utilize a resistor or resistor network.
- 327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous circuits which may utilize a resistor or resistor network. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 329, Demodulators, subclass 371 for coherer type amplitude demodulator.
- 330, Amplifiers, subclass 61 for carbon microphone type amplifiers.
- 333, Wave Transmission Lines and Networks, for negative resistors of the active element type. (Lines With Other Classes and Within This Class, above.)
- 333, Wave Transmission Lines and Networks, for wave transmission lines and networks including resistors. This class also provides for the combination of resistors and inductors and/or capacitors in such wave transmission lines and networks. See subclass 22 for dissipating terminations for long lines; subclass 80 for negative resistance networks of the active element type; and subclass 81 for attenuators. (See Lines With Other Classes and Within This Class, (1), "Plural Resistors as Defined in The Class Definition.")
- 333, Wave Transmission Lines and Networks, provides in subclass 22, for dissipating terminations for long lines; subclass 23, for artificial lines; subclass 80, for negative resistance networks of the active element type; and subclasses 82+, for resonators of the distributed parameter type. (See Lines With Other Classes and Within This Class, (4), "Devices Simulating Resistors.")
- 333, Wave Transmission Lines and Networks, appropriate subclasses, for wave transmission lines and networks including resistors. This



- class also provides for the combination of resistors and inductors and/or capacitors in such wave transmission lines and networks. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 336, Inductor Devices, appropriate subclasses, for inductor devices.
- 340, Communications: Electrical, for electrical communication systems; and especially subclasses 500+ for communication systems automatically responsive to a condition.
- 340, Communications: Electrical, appropriate subclasses, for electrical signaling and alarm systems including resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 343, Communications: Radio Wave Antennas, appropriate subclasses, for radiant energy communication systems including antennas combined with or including resistors.
- 361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems; subclasses 117+ for high voltage dissipators such as lightning arrestors systems, per se, and 271+ for capacitors.
- 361, Electricity: Electrical Systems and Devices, subclasses 627+ and 641+ for distribution panel board, control panel board, or electric service distribution box, including resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 362, Illumination, appropriate subclasses for illuminating devices which may include a resistor as an element thereof together with illumination structure.
- 363, Electric Power Conversion Systems, for electricity conversion systems; especially subclasses 15+ for systems converting electricity to heat to electricity; and subclasses 140+ for impedance type current converters.
- 363, Electric Power Conversion Systems, appropriate subclasses, for electrical conversion systems including resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 369, Dynamic Information Storage or Retrieval, subclass 152 for a resistive phonograph pickup.
- 373, Industrial Electric Heating Furnaces, subclasses 128+ for resistance elements and mountings for the same when peculiar to or combined with electric furnaces structure or controls for electric furnace.
- 373, Industrial Electric Heating Furnaces, subclasses 109+ for electric furnaces combined with the heating resistors, as a resistor with the furnace wall; or includes resistors which are formed to constitute at least part of a furnace, as being hollow to form a muffle or being recessed to form a crucible; or includes resistors which are peculiar to an electric furnace, as having the shape of the furnace, such shape having no significance elsewhere. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices" and (8), "Resistance Furnaces," above.)
- 374, Thermal Measuring and Testing, subclasses 183+ for thermometers having a current modifying sensor. (Lines With Other Classes and Within This Class, (13) "Measuring and Testing Devices With Variable Resistors")
- 374, Thermal Measuring and Testing, subclasses 163+ for a thermometer with an electrical sensor, particularly subclass 185 which includes detailed features of a resistive sensor in such a thermometer. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated in Other Devices," above.)
- 381, Electrical Audio Signal Processing Systems and Devices, for resistors specific to telephone use, including those of the microphone, its electrodes, and granules. (See Lines With Other Classes and Within This Class, above.)
- 381, Electrical Audio Signal Processing Systems and Devices, subclasses 179+ for resistors specific to telephone use, including those of the microphone, its electrodes, and granules. (See Lines With Other Classes and Within This Class, (1), Plural Resistors as Defined in The Class Definition.)
- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein an electrical product is produced.
- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein an electrical product is produced. (See Lines With Other Classes and Within This Class, (3), "Resistance Components and Subcombinations," and (9) "Resistors Formed By Coating Or Laminating.")
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a stock material product in the form of a single or plural layer web or sheet, which may embody a layer of

- material resistant to the flow of electrical current, and especially subclass 416, 418, 432+, 444, 450, and 457+ for a nonstructural composite web or sheet embodying a layer of metal next to a layer of nonmetal material.
- 428, Stock Material or Miscellaneous Articles, for a plural layer stock material product, note subclass 411 for a plural layer material, one layer being of resistive material, or one layer being resistive and one or more layers being conductive, so as to constitute one or more terminals; see especially subclasses 457+. (See Lines With Other Classes and Within This Class, (3), "Resistance Components and Subcombinations.")
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a plurality of layers of laminated or coated material, one layer being a resistance element and the other layer or layers being terminals, no particular structure being recited, but usually only particular materials, even though the terminals and resistance elements are claimed by such names. (See Lines With Other Classes and Within This Class, (9), "Resistors Formed By Coating Or Laminating.")
- 439, Electrical Connectors, especially subclass 241, 275 and 276, for electrical connectors and leads thereto, which leads may be nominally resistive. (See Lines With Other Classes and Within This Class, (11), "Electrical Connectors With Resistive Conductors," above.)
- 439, Electrical Connectors, appropriate subclasses, for resistance terminals, or the combination of a terminal and nominally recited resistance element. The combination of a resistance element broadly recited together with terminals at each end is classified in Class 338, especially subclasses 322+. (See Lines With Other Classes and Within This Class, (3), "Resistance Components and Subcombinations," above.)
- 442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, etc.), subclasses 59+ for a coated or impregnated fabric.
- 451, Abrading, subclasses 28+ for an abrading process which may be involved in making an electrical resistor.
- 454, Ventilation, appropriate subclasses, for ventilating structure such as cowls, hoods and louvers which may be used to ventilate a resistor.
- 455, Telecommunications, subclasses 120+ and 150.1+ for radio transmitter and receiver tuners wherein the tuning element may be somewhat analogous to resistors.
- 455, Telecommunications, appropriate subclasses for radio equipment having resistors. (See Lines With Other Classes and Within This Class, (2), "Resistors Combined With or Incorporated In Other Devices," above.)

## SECTION V - GLOSSARY

### BASE

Unless otherwise indicated an element along which the resistance element extends to impart a rigidity or reinforcement to the resistance element not otherwise present.

### CONDUCTOR

A body which is essentially a carrier of electric current with a minimum of loss as by heating.

### ELEMENT

Resistance element unless otherwise indicated.

### INSULATOR

A body of such low conductivity that the flow of current therethrough can usually be neglected.

### NEGATIVE RESISTOR

A resistor wherein the derivative of the voltage across the resistor with respect to the current passing through is negative over a portion of the current range.

### RESISTANCE

The property of a mass of material to impede the flow of a steady or fluctuating current passing through the mass by conversion of electrical energy into heat.

### RESISTANCE ELEMENT

The part of the resistor which actually possesses the resistance characteristic, and which may be a homogeneous mass of material having a resistance characteristic.

### RESISTANCE TERMINAL

Ordinarily one of the spaced conductors in physical contact with the resistance element, and being appreciably more conductive (less resistive) than the resistance ele-

ment. The terminals are for the purpose of connecting the resistance element in an external electric circuit. Since all resistors must include terminals in the sense that some structure is necessary to permit energization of the resistance element, the term “terminal” is sufficiently broad to include one of the free ends of the resistance element.

## RESISTOR

An apparatus or device exhibiting only and significantly a resistance characteristic as above defined to the current flowing therethrough, the inductive or capacitive effects being negligible. A resistor includes essentially a resistance element and spaced terminals.

## SEMICONDUCTOR

A body of solid material whose conductivity is considerably more than insulators, yet considerably less than metals.

## TERMINAL

One of the resistance terminals unless otherwise indicated.

## SUBCLASSES

**1** This subclass is indented under the class definition. Subject matter wherein the resistance element has the property of decreasing its resistance value upon the passage of a high frequency current therethrough; or together with structure which enables the resistor to return to its original resistance value upon termination of the high frequency current or to decohere.

- (1) Note. Usually the exciting high frequency current is a received high frequency wave, and the coherer is used as a radio detector. The resistance element is usually granular in nature; and the decohering is effected or facilitated as by particular chemical material, or by shock, stirring, agitating, or tapping. Where significant detector circuitry such as a resonant circuit is claimed with coherer, classification is elsewhere.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 20+, for resistors whose resistance value is changed by an electric current and/or voltage.  
32, for resistors whose resistance value is changed by a magnetic field.  
68+, for mechanically variable resistors.

## SEE OR SEARCH CLASS:

- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 43 for active solid-state type coherers.  
329, Demodulators, subclasses 315+ for frequency demodulators and subclasses 345+ for phase demodulators.

This subclass is indented under the class definition. Subject matter wherein a flexible or deformable solid mass of resistance material is formed as a wire, strip, or other elongated mass, the resistance value of the mass between points along its length changing with deformation between the points, as a change in length or cross-sectional area; the wire, strip, or other elongated mass being shaped or configured to be applied to a device which is subject to deformation in a direction along the length of the elongated mass, the mass being adapted to deform with the device; or wherein the wire, strip, or other elongated mass includes structure, such as adhesive material on a flexible base, for facilitating application to the device which is subject to deformation; or wherein the wire, strip, or other elongated mass is combined with and deformable with a device which is subject to deformation or other change in dimension and not otherwise classifiable.

- (1) Note. As between this subclass and Class 73, Measuring and Testing, when the meter, Wheatstone bridge connection, or other current measuring device in series with the resistor is claimed, classification is in Class 73.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 13+, for variable resistors generally actuated by a condition sensing device.  
114, for deformable resistors generally.

2

## SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 125+ for distance determining devices; subclasses 174+ for limit gauges; and subclasses 204+ for direction indicators.
- 73, Measuring and Testing, subclasses 763+ for an electrical stress or strain measuring system; and subclasses 862+ for dynamometers. See also (1) Note above.

- 3 This subclass is indented under subclass 2. Subject matter including resistance structure in series with the strain gauge resistor, whose resistance value increases or decreases significantly with the temperature change, for the purpose of offsetting at least partly the effect of temperature change on the strain gauge resistor or furnishing a reference for comparison purposes as in the Wheatstone bridge network in which the strain gauge resistor may be connected.

- (1) Note. The temperature coefficient of the resistance structure may have the same or opposite sign (positive or negative) as the temperature coefficient of the strain gauge resistor.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 7+, for resistors having resistance value temperature compensation.

- 4 This subclass is indented under subclass 2. Subject matter wherein the strain gauge is secured to or otherwise mechanically linked with a diaphragm, bellows, piston, or other device which is adapted to move or deform by a compresses fluid or gas acting thereon.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 36+, for mechanically variable resistors generally with a fluid or gas pressure sensing actuator.

## SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 720 and 726 for fluid pressure gauges of the current generating or modifying type.

- 324, Electricity: Measuring and Testing, subclasses 106+ for electrical time and speed measuring.

- 5 This subclass is indented under subclass 2. Subject matter wherein the device to which the strain gauge is attached is responsive to a force applied thereto, the portion of the device to which the strain gauge is attached being deformed by this force to deform the strain gauge.

- (1) Note. In this subclass, the device converts the applied force to strain or deformation.
- (2) Note. When the resistor strain gage is disclosed for making a quantitative measurement, proper classification is in the measuring class (see search notes below).

## SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 862+ for dynamometer measuring devices.
- 177, Weighing Scales, for weighing scales.

- 6 This subclass is indented under subclass 2. Subject matter wherein the strain gauge includes structure, such as pins, for engaging two spaced points for sensing any changes in the spacing of these two points, and for transmitting this sensed spacing change to the strain gauge to cause deformation thereof.

## SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 125+ for distance measuring instruments generally.
- 73, Measuring and Testing, subclasses 763+ for an electrical stress or strain measuring system and involving current generation or modification.

- 7 This subclass is indented under the class definition. Subject matter wherein the resistance element is formed of materials whose resistance value changes a relatively small amount with a change in the temperature of the element; or wherein one resistance material is combined with another resistance material in the same or different resistance elements, the change of resistance value of one material with the tem-

perature of the material being such as to offset at least partly the change of resistance value of the other material with the temperature of this material, the materials being always at the same temperature, e.g., one material has a positive temperature coefficient and the other material has a correspondingly negative temperature coefficient; or wherein the support or actuator for the resistor includes material or structure which offsets at least partly the effect of or resists dimensional changes due to temperature change in the support or actuator, which otherwise would result in a change in resistance value.

- (1) Note. Only compensation structure is classified here which at least partly controls or modifies the resistance value of the resistor. Resistors with temperature compensated supports which merely maintain the position of the resistor unchanged with temperature change, for example, are classified in subclass 316 below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3, for strain gauge type resistors with temperature compensation.  
 14, for resistors whose resistance value is responsive to a plurality of conditions.  
 25+, for resistors whose resistance value is responsive to ambient temperature.  
 316, for supports which compensate for expansion or contraction with temperature. See also (1) Note above.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclass 140 for electric circuits for relays and electromagnets having means compensating for thermal changes.
- 8 This subclass is indented under subclass 7. Subject matter, including structure or material which is directly operative on the actuator to offset the effect of or reduce or prevent a change in dimension of the actuator due to temperature change.
- 9 This subclass is indented under subclass 7. Subject matter including an additional resistor or resistance element, whose temperature coef-

ficient is of opposite sign (positive or negative) from the temperature coefficient of the original resistor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 3, for strain gauge type resistors including a temperature compensating resistor.  
 48, for plural separate diverse resistors.  
 322, for plural resistance elements in parallel between terminals.

- 10 This subclass is indented under subclass 9. Subject matter wherein both the resistance elements or the resistance elements of both resistors are elongated in shape, as wires or filaments.

- 11 This subclass is indented under the class definition. Subject matter including structure which is spaced from and positioned with respect to the resistance element to redirect any heat impinging on the structure from an external source onto the resistance element, or to redirect any heat produced by the resistance element and impinging on the structure back on the resistance element.

- (1) Note. The heat reflectors in this subclass are restricted to directing heat toward the resistance element or to redirecting the heat produced by the element back to the element. Where the heat produced by the element is directed by reflectors for heating some object other than the element itself classification is in the electric heating class (see the search note below)

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 226+, for a resistor with a heat insulating housing, which may even protect the resistor from external heat by reflection, i.e., prevent the external heat going to the resistance element; and especially subclasses 234+ for a resistor with a gaseous or vacuum layer between the element and the casing or housing.  
 334, for a resistor with a heat protecting shield other than a casing, and not classified elsewhere.

## SEE OR SEARCH CLASS:

- 219, Electric Heating, especially subclass 34 for where the heat produced by the element is directed by reflectors for heating some object other than the element itself; subclass 540 for electric heating radiators. See also (1) Note above.
- 432, Heating, subclass 50 for shielding devices in connection with heating furnaces or other hot objects acting as a screen or baffle to heat.

- 12** This subclass is indented under the class definition. Subject matter including a mechanically variable resistor together with a partition, wall, or housing; and a movable magnet, usually permanent, which when moved is effective by its field through the partition, wall, or housing to change the mechanical setting of the variable resistor and thus change the resistance value of the variable resistor.

- (1) Note. Usually a second magnet is disposed on the opposite side of the partition, wall, or housing from the movable magnet, the second magnet being mechanically linked with the variable resistor and being adapted to be moved by the field of the first movable magnet.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 1, for coherer type resistors.
- 32, for resistors generally whose resistance value is responsive to a magnetic field or compass.
- 103+, and 116, for mechanically variable resistors with an electromagnetic operator.

## SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, subclass 103 for magnetic field type clutches or brakes.

- 13** This subclass is indented under the class definition. Subject matter including a resistor usually mechanically variable to change its resistance value, linked with actuating structure which senses and responds significantly well to a particular stimulus or condition or change in such stimulus or condition; or including a resis-

tor, usually nonmechanically variable, having the property as by shape or chemical composition of changing its resistance value significantly well in response to a particular stimulus or condition or change in such stimulus or condition; and usually together with structure as part of the resistor or in addition to the resistor for applying or facilitating the application of this stimulus or condition to the resistor.

- (1) Note. For classification here the actuator must be something more than merely adapted to have a force applied thereto for the actuation of the mechanical variable or adjustable resistor, as a knob, pedal, or handle. The actuator must sense the condition or change in condition, and respond in some manner as by moving or deforming. When a meter Wheatstone bridge connection or other indicating device for indicating the current passing through a resistor together with the resistor and condition sensing device are recited, classification is not here, but in such Classes as 33, Geometrical Instruments and 73, Measuring and Testing. 374, Thermal Measuring and Testing, Microphones are classified in Class 381, Electrical Audio Signal Processing Systems and Devices, even when the output circuitry is not recited. Similarly, resistive phonograph pickups are classified in Class 369, Dynamic Information Storage or Retrieval, subclass 152. However a mere variable resistor adapted to be actuated by a stylus (unclaimed) is classified in this subclasses 13+. A mere statement of use as a resistor whose value changes in response to a sensed condition is not sufficient for classification here. The structure or chemical composition which at least contributes to this result must be recited in the claims.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 2+, for a strain gauge resistor with a particular condition sensing actuator.

## SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, appropriate subclasses, for geometrical instruments.

- 73, Measuring and Testing, appropriate subclasses, for measuring and testing devices.
- 177, Weighing Scales, subclass 211 for a weighing scale including an electrical strain gauge.
- 200, Electricity: Circuit Makers and Breakers, subclasses 52+ for electric circuit makers and breakers of special application.
- 318, Electricity: Motive Power Systems, subclasses 445+ for systems of automatic motor control.
- 323, Electricity: Power Supply or Regulation Systems, subclasses 293+ for automatic impedance systems.
- 334, Tuners, subclasses 5+ for tuners which are responsive to a condition.
- 340, Communications: Electrical, especially subclasses 177+ and 500+, for electrical systems for telemetering or indicating electrically a sensed condition.
- 361, Electricity: Electrical Systems and Devices, subclass 91.2 for overvoltage protection with resistor sensor.
- 369, Dynamic Information Storage or Retrieval, subclass 152 for resistive phonograph pickups.
- 374, Thermal Measuring and Testing, appropriate subclasses for measuring and testing of thermal quantities.
- 14** This subclass is indented under subclass 13. Subject matter including two or more actuating structures together with a variable resistor each responsive to an independent stimulus or condition, which may be of the same or different type; or including a resistor whose element has the property of changing its resistance value particularly well in response to two or more independent conditions or stimuli applied thereto; or including a variable resistor whose element is responsive directly to a condition together with an actuator responsive to an independent condition.
- 15** This subclass is indented under subclass 13. Subject matter wherein the resistor is formed of a material whose resistance value changes materially upon the application of light, infrared radiation, or ultraviolet radiation to the resistor, or upon a change in the intensity of this radiation applied to the resistor together with any structure which facilitates the application of light or ultra violet or infrared radiation to the resistor.
- 16** This subclass is indented under subclass 15. Subject matter including structure for eliminating or reducing vibration or offsetting the effect thereof, as a shock absorbing support for the resistance element.
- 17** This subclass is indented under subclass 15. Subject matter including two or more resistors as there defined or a single resistor having two or more elements.
- (1) Note. Usually the resistors or elements are arranged in a planar pattern as a mosaic.
- SEE OR SEARCH CLASS:**
- 136, Batteries: Thermoelectric and Photoelectric, subclass 89 for primary photoelectric batteries.
- 250, Radiant Energy, subclasses 200+ for photocell circuits and apparatus.
- 252, Compositions, subclass 501 for light sensitive conductive compositions.
- 374, Thermal Measuring and Testing, subclasses 121+ for radiation type thermometers.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 98, for mechanically adjustable or variable resistors with motion damping and/or vibration control means.
- 171, for a variable resistor with a contact slidable on the resistance element, the contact having plural element engaging portions which may reduce the effect of vibration.
- 315+, for resistors generally with mounting or supporting means, which may include anti-vibration structure.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 320, for plural supported or mounted resistors.
- 322, for resistors having a plurality of elements between terminals.

## SEE OR SEARCH CLASS:

- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as electrical article.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer stock material product, one layer being of resistance material and another layer being conductive, note especially subclasses 195+ for a discontinuous or differential coating, impregnation or bond.

- 18** This subclass is indented under subclass 15. Subject matter wherein the material of which the resistor is formed changes its resistance value materially upon the application of infra red radiation thereto.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 25+, for resistors whose resistance value changes with ambient temperature.

- 19** This subclass is indented under subclass 15. Subject matter including a casing or covering such as a glass or quartz envelope containing the photoconductive element, at least a portion of the casing or covering freely passing the radiant energy which impinges on the photoconductive element.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 184, and 199, for mechanically variable resistors with housings.
- 226+, for incased, embedded, or housed resistors generally; and especially subclasses 234+, for such resistors with gaseous or vacuum spacing between the element and the casing or housing.

- 20** This subclass is indented under subclass 13. Subject matter wherein the resistor is chemically constituted or otherwise formed to change its resistance value in response to an electric current passing through or a voltage impressed across the resistor, or wherein the resistor includes structure or composition which enables the resistor to change its resistance value in response to a current or voltage applied to a circuit other than to the resistor

itself; as to an electric heater with a heat conducting path to the resistor.

- (1) Note. Usually the current increases the temperature of the resistor either directly or indirectly, and the resistor has an appreciable resistor temperature coefficient to cause the resistance value to change. In the case of the so-called voltage responsive resistors, a voltage change often produces a current change which in turn changes the resistance value as through the heating effect of the current. However, some resistors here classified do change value directly with the voltage gradient existing therein.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 25+, for resistors whose resistance value changes with ambient temperature.
- 103+, and 116, for mechanically adjustable or variable resistors with an electromagnetic operator, such as an electric motor.

## SEE OR SEARCH CLASS:

- 313, Electric Lamp and Discharge Devices, subclasses 341+ for electric lamp and discharge device filaments.
- 323, Electricity: Power Supply or Regulation Systems, subclasses 293+ for impedance systems automatically responsive to voltage and/or current.

- 21** This subclass is indented under subclass 20. Subject matter wherein the resistance element is formed of material whose resistance value changes sharply and often discontinuously upon a change in terminal voltage from a low to a relatively high value or upon a rise in the terminal voltage above a threshold value.

## SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices subclasses 1+ for safety and protection systems and subclasses 117+ for high voltage dissipators such as lightning arrester systems.

- 22** This subclass is indented under subclass 20. Subject matter wherein the resistance element is formed of a semi-conductor material and has



a relatively high temperature coefficient, which is usually negative.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

25+, for thermistors whose resistance values are changed by ambient temperature.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), subclass 53, 108, and 467-470 for active solid-state type temperature responsive devices.

323, Electricity: Power Supply or Regulation Systems, subclass 294 and subclasses 364+ for impedance systems responsive to a thermal condition.

**23** This subclass is indented under subclass 22. Subject matter wherein a resistance heater for the thermistor is provided other than the thermistor resistance and in a current circuit distinct from the current circuit through the thermistor.

(1) Note. The heater circuit may be in series or shunt with the thermistor, or be in another electrical system.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

24, for resistors generally whose resistance value changes in response to a current which indirectly heats the resistance element.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 50+ for electrical resistance heaters.

**24** This subclass is indented under subclass 20. Subject matter wherein a resistance heater for the resistor is provided other than the resistance element and in a current circuit distinct from the current circuit through the element.

(1) Note. The heater circuit may be in series or shunt with the resistance element or be in another electrical system.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

23, for thermistor type resistors whose resistance value changes in response to a current which indirectly heats the resistance element.

SEE OR SEARCH CLASS:

219, Electric Heating, subclasses 50+ for electrical resistance heaters.

**25** This subclass is indented under subclass 13. Subject matter wherein the resistance element includes material which effects a significant change, such as sharp, rapid, or pronounced, in the resistance value of the element with a change in the surrounding temperature, or together with structure which facilitates this change in resistance value with the surrounding temperature; or including a mechanically adjustable or variable resistor together with structure whose shape, configuration or any other dimension changes with a change in surrounding temperature, the structure being linked with the adjustable or variable resistor to change in resistance value with the change in shape, configuration or other dimension occurring in the temperature sensing structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

7+, for resistors with compensation for a change in resistance value due to temperature change.

20+, for resistors whose resistance value changes in response to a current or voltage, which may involve a change in the ambient temperature of the resistor.

51, for resistors with heat dissipating projections.

53+, for resistors with cooling gas or liquid circulation.

59, for resistors with heat storing.

SEE OR SEARCH CLASS:

236, Automatic Temperature and Humidity Regulation, appropriate subclasses, for automatic temperature controls, especially the subclasses found under THERMOSTATIC.

- 313, Electric Lamp and Discharge Devices, subclass 14 for temperature modified pyroelectric type devices.
- 323, Electricity: Power Supply or Regulation Systems, subclass 294 and subclass 364+ for thermally responsive impedance systems.
- 340, Communications: Electrical, subclasses 584+ and 577+ for electrical systems generally responsive to temperature and flame, respectively.
- 374, Thermal Measuring and Testing, subclasses 183+ for current modifying type thermometers.
- 26** This subclass is indented under subclass 25. Subject matter wherein the resistor is flexible or deformable and has an elongated shape with substantially uniform external size over its length, the resistance element extending between the ends of the resistor.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
212, for tape type resistors generally.  
214, for cable type resistors generally.
- 27** This subclass is indented under subclass 25. Subject matter wherein the resistance element or contact is a liquid, the liquid sensing the change in the surrounding temperature.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
80+, and 222, for mechanically variable and fixed resistors respectively having liquid resistance elements.  
94, 151 and 156, for mechanically variable resistors having a liquid contact.
- 28** This subclass is indented under subclass 25. Subject matter wherein the resistor is formed as an elongated rigid unit, one end being free and the other end including the resistor terminal or the portions of the terminals connecting the external circuitry, as well as any structure for manipulating the unit, such as a handle, or for securing the unit to supporting structure.
- (1) Note. Usually the resistance element is enclosed in an elongated casing which forms the exterior of the probe.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
229, for probe type incased, embedded or housed resistors generally.
- SEE OR SEARCH CLASS:  
324, Electricity: Measuring and Testing, subclass 149 for electricity measuring devices including a probe.
- 29** This subclass is indented under subclass 28. Subject matter including a mechanically adjustable or variable resistor as defined in subclass 68 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
68+, for mechanically adjustable or variable resistors generally.
- 30** This subclass is indented under subclass 28. Subject matter wherein one or both of the terminals form a substantial part of the probe casing or housing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
271, for resistors generally one of whose terminal forms a casing or housing.
- 31** This subclass is indented under subclass 25. Subject matter including a mechanically adjustable or variable resistor as defined in subclass 68 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
68+, for mechanically adjustable or variable resistors generally.
- 32** This subclass is indented under subclass 13. Subject matter wherein the resistance element includes material whose resistance value is dependent on a magnetic field applied directly thereto, or together with means for applying or facilitating the application of a magnetic field to this material of the resistance element; or wherein a resistor is mechanically linked with the magnet of a magnetic compass to be actuated by this magnet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 43, for resistors responsive to inertia devices, such as a gyro compass.
- 103+, for a compressible type resistor with an electromagnetic operator.
- 116, for mechanically variable resistors generally with an electromagnetic operator such as an electric motor.

SEE OR SEARCH CLASS:

- 257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses, including subclass 108, 414, and 421-427 for devices responsive to magnetic field.
- 329, Demodulators, appropriate subclasses for magnetic demodulators using, for example, the Hall effect.

**33** This subclass is indented under subclass 13. Subject matter wherein an adjustable resistor is combined with a float, which is mechanically linked with the resistor actuator to vary the resistance value in accordance with the position of the float.

- (1) Note. The subject matter in this subclass is usually a subcombination of a liquid level or depth gauge as classified in Class 73, Measuring and Testing, subclasses 305+. Where the indicator is recited as an added element, classification is in subclasses 305+ of Class 73. The mere recitation of the tank broadly does not preclude classification in this class (338). Where details of the tank are recited, classification is elsewhere such as Class 137, Fluid Handling, subclass 560 for a tank with an out-flow pipe together with a float operated rheostat.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 34+, for resistors whose resistance value is dependent on the gas, vapor, or moisture absorbed or collected.
- 36+, for mechanically variable resistors with structure responsive to fluid pressure.
- 68+, for mechanically adjustable or variable resistors, per se.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 305+ for liquid level or depth gauges including a float operated rheostat; and subclasses 451+ for specific gravity or density measurement of a liquid including a float operated rheostat. See also (1) Note above.
- 137, Fluid Handling, appropriate subclasses, for fluid handling systems. See also (1) Note above.
- 340, Communications: Electrical, subclasses 177+ for float operated telemetric systems.

**34** This subclass is indented under subclass 13. Subject matter including material or structure which readily absorbs or collects or facilitates the absorption or collection of fluent material such as liquids, gases, vapors, or humidity to which the resistor may be exposed, and usually which relinquishes all or part of the fluent material so absorbed or collected upon reduction in the intensity or termination of the exposure thereto, the material so collected or absorbed usually providing the electrical resistance, the value of the resistance depending on the amount of material absorbed.

- (1) Note. The fluent material may be collected on the surface or absorbed within other material of the resistor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 80+, for mechanically adjustable or variable liquid resistors.

SEE OR SEARCH CLASS:

- 23, Chemistry: Physical Processes, subclasses 230+ and 253+ for analytical and analytical control methods and apparatus respectively.
- 73, Measuring and Testing, subclasses 73+ for measuring the moisture content or absorption characteristics of materials.
- 200, Electricity: Circuit Makers and Breakers, subclasses 61.04+ for circuit making or breaking devices responsive to liquid or moisture.

- 318, Electricity: Motive Power Systems, subclass 483 for motor control systems automatically operative in response to moisture content or wetness.
- 340, Communications: Electrical, subclass 602, for electrical communications systems automatically responsive to moisture or humidity; and subclasses 628+ and 632+ for such systems responsive to smoke and gas; respectively.
- 35** This subclass is indented under subclass 34. Subject matter wherein the resistor is peculiarly adopted to collect or absorb moisture from the air.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclasses 335+ for hygrometers.
- 36** This subclass is indented under subclass 13. Subject matter wherein the condition sensed is fluid or gas pressure and the resistor actuator engages this fluid or gas and is mechanically moved or deformed by the pressure of this fluid or gas.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
4, for strain gauge resistors which are fluid or gas actuated.  
33, for float actuated resistors.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclasses 290+ for liquid depth gauges; and subclasses 700+ for fluid pressure gauges.  
340, Communications: Electrical, subclasses 603+ for fluent material operated alarms.
- 37** This subclass is indented under subclass 36. Subject matter wherein the condition sensed is the air pressure in the tire of a vehicle, and including structure for sensing this pressure and not otherwise classifiable.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
50, for resistors mounted on wheels or vehicles.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclasses 146.3+ for direct pressure reading of tire inflation.  
137, Fluid Handling, subclasses 227+ for tire stem inflation means with a gauge or indicator.  
200, Electricity: Circuit Makers and Breakers, subclasses 61.22+ for pneumatic tire inflation responsive switches.  
340, Communications: Electrical, subclass 58 for electrical systems automatically responsive to tire deflation.
- 38** This subclass is indented under subclass 36. Subject matter wherein a liquid resistance element or contact is arranged to rise and fall over contact or resistance structure to give a variable resistance according to the condition sensed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
80+, for mechanically variable resistors having liquid resistance elements.  
94, for a mechanically adjustable resistor having a liquid short circuiting contact.  
151, for a mechanically variable resistor having a liquid contact in which the resistance element moves.  
156, for a mechanically variable resistor with a liquid contact.  
222, for a fixed resistor having a liquid element.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclass 750 for liquid column fluid pressure gauges such as manometers.
- 39** This subclass is indented under subclass 36. Subject matter wherein the resistor actuator is a piston or plunger.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
33, for a resistor actuated by a float.
- SEE OR SEARCH CLASS:  
73, Measuring and Testing, subclass 746 for fluid pressure gauges having a pis-

ton as the pressure responsive element.

- 40** This subclass is indented under subclass 36. Subject matter wherein the resistor actuator is a Bourdon tube.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclass 734 for fluid pressure gauges having a Bourdon tube for their pressure responsive element.  
200, Electricity: Circuit Makers and Breakers, subclass 81.8 for Bourdon tube operated switches.

- 41** This subclass is indented under subclass 36. Subject matter wherein a cylindrical or cup shaped expansible chamber has side walls comprising sections of alternately larger and smaller cross-sections which make up a single fluid or gas chamber having a zigzag or pleated wall, or wherein an expansible chamber device includes a plurality of movable walls, two or more of which are of the flexible sheet material or diaphragm type whereby vertical collapse or expansion of the chamber is facilitated.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 786 and 793+ for expansible chamber fluid handling devices of the bellows or capsule type.

- 42** This subclass is indented under subclass 36. Subject matter wherein the resistor actuator is a diaphragm, or a flexible or deformable wall or casing structure.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 262+ for volume or rate of flow meters with a diaphragm or collapsible wall; subclasses 278 and 279+ for diaphragm mountings and diaphragms for such meters; and subclasses 719 and 725 for fluid pressure gauges including a diaphragm.

- 43** This subclass is indented under subclass 13. Subject matter wherein the actuator or reference for the actuator is a mass which is at least partly free to operate under the effect of its inertia, or under the effect of its weight to seek

a lower level and thus maintain a vertical stabilization as for reference purposes.

SEE OR SEARCH CLASS:

- 73, Measuring and Testing, subclasses 652+ for vibration testing with an inertia sensing element.

- 44** This subclass is indented under subclass 43. Subject matter wherein the resistance element or its contact is a liquid, and the actuator is this liquid element or contact, which is operated by its inertia or level seeking characteristic.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 80+, and 222, for a mechanically variable and fixed resistor respectively having a liquid resistance element.  
94, 151 and 156, for mechanically variable resistors having liquid contacts; especially subclass 151, for such resistors whose elements move and whose liquid contact is fixed at the lowest level by gravity.

- 45** This subclass is indented under subclass 43. Subject matter wherein the actuator is subject to rotation to thus develop a centrifugal force to control the variable resistor.

SEE OR SEARCH CLASS:

- 264, Plastic and Nonmetallic Article Shaping or Treating: Processes, subclasses 15+ for centrifugal speed responsive devices.  
318, Electricity: Motive Power Systems, subclass 325 for electric motors having a centrifugally operated speed control

- 46** This subclass is indented under subclass 43. Subject matter wherein the actuator for the variable resistor is a pendulum.

SEE OR SEARCH CLASS:

- 33, Geometrical Instruments, subclasses 215+ for pendulum type direction indicators and subclass 366.24 for a level having a pendulum controlled electrical indicator and subclass 366.24 for a level having a pendulum controlled electrical indicator.

- 73, Measuring and Testing, subclasses  
862.381+ for pendulum type dynamometers.
- 47** This subclass is indented under subclass 13. Subject matter wherein the actuator is constructed to facilitate the application of a force thereto, and to mechanically move or deform in response to this force to provide a mechanical movement for the operation of the variable resistor, the force being substantially greater than necessary to operate the resistor.
- (1) Note. Since force is the most common method of operating mechanically variable resistors, a mere knob, pedal or handle as an actuator is not sufficient for classification here. The force sensing mechanism must be able to respond directly to forces substantially greater than or bearing little relationship to the force necessary to adjust the variable resistor or to overcome any spring loading of the variable resistor for classification in this subclass. Pushing, pulling and torque are examples of the forces sensed by the subject matter of this subclass.
- (2) Note. When the resistor strain gage is disclosed for making a quantitative measurement, proper classification is in Class 73, subclasses 862+.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 5, for dynamometer type strain gauge resistors.
- 36+, for a variable resistor with a condition sensing actuator producing a force by a fluid or gas pressure.
- 68+, for mechanically adjustable or variable resistors; especially subclasses 99+ for such resistors of the compressible type; and subclass 167, for such resistors with spring loaded angularly slidable contacts.
- SEE OR SEARCH CLASS:
- 73, Measuring and Testing, subclasses  
133+ for dynamometers.
- 177, Weighing Scales, appropriate subclasses, for weighing scales.
- 48** This subclass is indented under the class definition. Subject matter wherein a first resistor is combined with a physically distinct second resistor which is significantly structurally different from the first resistor.
- (1) Note. For classification here the two resistors must be claimed together with the distinction of one resistor over the other. A mere claimed difference in dimensions or resistance values as one resistor being coarse and the other fine is not a sufficient distinction for classification herein. The claimed distinctions for classification here must be in the structure or shape of the resistor or the resistor combined with perfecting subject matter, as for example when each resistor is a different species and is classified in different subclasses in this schedule.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 9, for a resistor with an additional temperature compensating resistor.
- 23, and 24, for indirectly heated current and/or voltage responsive resistors.
- 49, for shunt type resistors which may have diverse terminals.
- 67, for resistors combined with diverse nonelectrical devices.
- 122, for mechanically variable resistors with contacts movable over coarse and fine resistance elements.
- 286, for resistors having both a helical and a zigzag configuration.
- 324, for single resistors having diverse terminals.
- 49** This subclass is indented under the class definition. Subject matter wherein the resistor is peculiarly adapted for shunting a metering instrument, the resistor terminals usually being of large mass and having a plurality of sets of connectors, one smaller set for the instrument and the other larger set for the main current leads, the resistance element extending therebetween and usually being flat or formed with ventilating means such as fine or vented passages, or with a plurality of separate current paths to present a large cooling surface to maintain uniform temperature and prevent change in the resistance value or the resistor.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 51, for resistors with heat dissipating projections, e.g., vanes.
- 322, for plural resistance elements in parallel between terminals.
- 324, for fixed resistors having diverse terminals.

## SEE OR SEARCH CLASS:

- 324, Electricity: Measuring and Testing, subclass 126 for measuring or testing instruments having coupling means, e.g., shunts.

**50** This subclass is indented under the class definition. Subject matter wherein the resistor is provided with wheels for increasing the mobility of the vehicle, or wherein the resistor is mounted on a vehicle especially adapted for carrying only the resistor together with its operating structure or a plurality of such resistors.

- (1) Note. Where the vehicle is adapted for other purposes then merely carrying the resistor and its operating structure, classification is not here. See also the Search Notes below.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 67, for resistors with diverse nonelectrical devices. See also (1) Note above.
- 197, for mechanically variable resistors with supports.
- 315+, for resistors generally with mounting or supporting means.

## SEE OR SEARCH CLASS:

- 105, Railway Rolling Stock, subclass 61 for electric railway cars including a controlling resistor.
- 180, Motor Vehicles, subclass 65 for electric vehicles generally; and subclasses 77+ for such vehicles including electric motor controlling devices, which may be resistors.

**51** This subclass is indented under the class definition. Subject matter wherein a surface of the resistance element, casing, terminal, or other resistance structure is enlarged or increased in

area over what is otherwise necessary by a projecting portion integral therewith or attached thereto, such as vanes, fins, or corrugations, to increase the heat radiated, dissipated, or otherwise transferred from the surface structure of the resistor to the surrounding or adjacent medium.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 49, for shunt type resistors.
- 53+, for resistors with cooling gas or liquid circulation.
- 159, for a mechanically adjustable or variable resistor with a heat conducting or distributing path.
- 226+, for resistors generally with heat conducting casings or housings.

## SEE OR SEARCH CLASS:

- 165, Heat Exchange, subclass 185 for a fin or heat transmitter, per se.
- 219, Electric Heating, subclass 34 for heating radiators.

**52** This subclass is indented under subclass 51. Subject matter wherein the resistance element is granular or powdered in form or is formed as a plurality of layers or other distinct masses stacked or piled transversely to the direction of current flow through the resistance element; i.e., so that the current flowing through the resistance element will flow from mass to mass.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 54, for resistors with cooling gas or liquid circulation, and having granular powdered or transversely stacked elements.
- 99+, for mechanically variable resistors including surfaces pressed together for adjustment purposes, e.g., compressible type; and subclass 115 for such resistors generally whose elements are in piled or stacked layers.
- 204+, for resistors generally whose elements are piled or stacked between terminals.
- 223+, for resistors having granular or powdered elements.

**53** This subclass is indented under the class definition. Subject matter wherein the resistor includes structure which conveys a cooling gas or liquid to, from or through the resistor, or which permits a cooling gas or liquid to move to or from the resistor for the purpose of cooling the resistor by conveying away the heat produced by the resistor.

- (1) Note. Subject matter in this subclass is very similar to subject matter in Class 219, Electric Heating, subclasses 50+, since cooling a resistor by gas or liquid is analogous to heating gas or liquid with a resistor. In the resistors in this subclass (53) the heat produced is usually incidental and undesired, and the fluid or gas dissipates this heat. In the heating resistors of Class 219 the resistor is adapted for heating purposes as opposed to impedance purposes, and the heat produced is distributed or directed for such heating purposes as opposed to mere dissipation. However, a mere resistor with heating or cooling fluid or gas circulation, even though designated as a heater, is classified in this subclasses (53+). For classification in Class 219, structure must be claimed which adapts the resistor, or the fluid gas circulating structure for heating purposes. See also the Notes under the Class Definition for the general lines between this class (338) and Class 219.
- (2) Note. A resistor with a liquid gas or vacuum enclosing casing is not classified here even though the liquid or gas is of heat conducting material, but in such subclasses as 231 and 234+ below. For classification in this subclasses (53+) the liquid or gas must circulate.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 7+, for resistors with temperature compensation.
- 231, for resistors generally whose elements are incased in a liquid. See also (2) Note above.
- 234+, for resistors generally with a gaseous or vacuum spacing between the ele-

ment and the casing or housing. See also (2) Note above.

**SEE OR SEARCH CLASS:**

- 62, Refrigeration, appropriate subclasses, for refrigeration devices.
- 165, Heat Exchange, appropriate subclass for heat transferring devices generally.
- 219, Electric Heating, especially subclasses 50+, and 280+ for electric resistance air and liquid heaters. See also (1) Note above.

**54** This subclass is indented under subclass 52. Subject matter wherein the resistance element is granular or powdered in form or is formed as a plurality of layers or other distinct masses stacked or piled transversely to the direction of current flow through the resistance element, i.e., so that the current flowing through the resistance element will flow from mass to mass.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 52, for resistors with heat dissipating projections, and having granular powdered or transversely stacked elements.
- 99+, for mechanically variable resistors including surfaces pressed together for adjustment purposes, e.g., compressible type; and subclass 115 for such resistors generally whose elements are in piled or stacked layers.
- 204+, for resistors generally whose elements are piled or stacked between terminals.
- 223+, for resistors having granular or powdered elements.

**55** This subclass is indented under subclass 53. Subject matter including means for conveying or facilitating the conveyance of liquid to or from the resistance element or terminals, or to structure in heat conducting relation to the element to carry away at least part of the heat produced by the element or terminals by motion of the liquid.

- (1) Note. A mere heat conducting liquid without motion or circulation of the liquid is not classified here, but in subclass 231 below. Where structure is claimed



for controlling or directing the heat to the liquid, or controlling or utilizing the heated liquid for heating purposes as opposed to mere dissipation of the heat, classification is elsewhere (see search notes below). See also (1) Note under subclass 53 above.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 57, for resistors with vented or ventilating casing or housings.
- 231, for resistors generally incased in a liquid. See also (1) Note above.

**SEE OR SEARCH CLASS:**

- 165, Heat Exchange, subclasses 104.19+ for a residual system exchanging heat through a recycling fluid.
- 219, Electric Heating, subclasses 280+ for electric fluid heaters. See also (1) Note above.
- 333, Wave Transmission Lines and Networks, subclass 22 for dissipating terminations for long lines involving a liquid coolant.

- 56** This subclass is indented under subclass 55. Subject matter wherein the circulating or moving liquid is also the resistance element, and by such circulation or motion the element is cooled or cools itself.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 222, for resistors generally with liquid elements.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclasses 284+ for electric fluid heaters, wherein the fluid is heated by the passage of electric current directly therethrough.

- 57** This subclass is indented under subclass 53. Subject matter including a casing or housing of solid material which substantially entirely encloses the resistance element, the casing or housing having openings therein joining the resistance element with the surrounding medium to permit circulation of air or other gases to and from the resistance element.

- (1) Note. The subject matter here is restricted to casings with vents or other openings transmitting air or other gases. Subclasses 55+ provides for resistors with casings and liquid cooling. Further the air or gas must be free to circulate for classification here. Subclasses 234+ provides for an incased, embedded or housed resistor with a gaseous or vacuum spacing between the element and casing or housing without the ventilation or cooling. The ventilation may be forced as by a fan as well as naturally for classification here. Subclasses 226+ below provides for resistors generally with casings or housings which transmit heat through the material to the casing or housing. A mere open ended sleeve surrounding the resistance element is not sufficient to constitute a vented casing for classification here, but rather is classified in subclass 53 above, if air circulation is present.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 51+, for resistors with heat dissipating projections, e.g., vanes.
- 53+, for resistors with ventilating passages or spaces generally. See also (1) Note above.
- 55+, for incased resistors with a liquid cooling medium. See also (1) Note above.
- 234+, for incased, embedded or housed resistors generally with a gaseous or vacuum spacing between the element and the casing or housing. See also (1) Note above.
- 277, for resistors with protecting structure such as guards, screens, and mechanical shields.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclass 16.1 for a mere housing or casing for an electrical device with means to provide for ventilation of the interior of the casing.
- 219, Electric Heating, subclasses 280+ for fluid resistance heaters. See also (1) Note under subclass 53 above.

- 312, Supports: Cabinet Structure, subclass 213 for enclosures with ventilated openings not otherwise classifiable.
- 336, Inductor Devices, subclass 59 for inductors with vented casings.
- 454, Ventilation, appropriate subclasses, for ventilating structure such as cowls, hoods and louvers.
- 58** This subclass is indented under subclass 53. Subject matter wherein the resistor is of zigzag or helical type as defined in subclasses 283 and 296 respectively below, together with structure which transmits or facilitates the transmission of air or other gases to and into contact with the resistance element for cooling purposes.
- (1) Note. The ventilating structure may be air passages or a particular spacing of the resistance element or parts thereof to facilitate air cooling. For classification here, the resistance element must be directly ventilated. A mere passage in a core or support for cooling purposes and not leading directly to the element, is not classified here, but in such subclasses as 53 and 55+, above.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 53, for resistors with ventilating passages or spaces generally. See also (1) Note above.
- 57, for a zigzag or helical resistor with a ventilating casing or housing, the zigzag or helical resistor also being ventilated.
- 283+, for resistors with zigzag or sinuous resistance elements generally.
- 296, for resistors with helical or wound resistance elements generally.
- 59** This subclass is indented under the class definition. Subject matter wherein the resistor includes or is combined with a mass of material which is adapted to absorb and retain significantly well the heat produced by the resistance element, or the heat existing in the medium surrounding the resistor, or structure which is peculiarly adapted to support such a mass in or on the resistor.
- (1) Note. Examples of subject matter here are resistors having a surrounding iron mass for storing the resistor heat, or resistors having containers for storing ice.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 53+, for a resistor with a circulating gas cooling medium.
- 55+, for a resistor with a circulating liquid cooling medium.
- SEE OR SEARCH CLASS:
- 126, Stoves and Furnaces, subclass 400 for heat accumulators.
- 60** This subclass is indented under the class definition. Subject matter wherein the resistor includes distinct structure or arrangement of parts which reduce or eliminate the resistor capacity or the effect of the resistor capacity in the resistor.
- (1) Note. For classification here the definite structure or arrangement of parts must be for reducing or eliminating the inherent capacity of the resistor as opposed to some type of electric shielding to reduce the effect of external capacity (e.g., hand capacity) on the resistor. Resistors having shielding to reduce or eliminate external capacity effects are classified in 64+ below.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 61, for resistors having structure to reduce or eliminate inductance or the effect of inductance on the resistance.
- 64+, for resistors having electrical shielding. See also (1) Note above.
- 334, for resistors electrically connected to other electric devices, and not elsewhere classified.
- SEE OR SEARCH CLASS:
- 361, Electricity: Electrical Systems and Devices, subclasses 271+ for capacitors combined with some other type of subject matter.

**61** This subclass is indented under the class definition. Subject matter wherein the resistor includes distinct structure or arrangement of parts which reduce or eliminate the resistor inductance or the effect of the resistor inductance in the resistor.

- (1) Note. For classification here definite structure or arrangement of parts must be present to reduce or eliminate the inductance. A resistor with a coated, granular, or straight rod resistance element, for example, which inherently has a relatively low inductance, is not classified here, but in such subclasses as 223+, 308 and 322+, respectively. Further the structure or arrangement must be for reducing or eliminating the inherent inductance in the resistor as opposed to some type of electric shielding to reduce the effect of some external inductance. Subclasses 64+ below provides for resistors with electrical shields.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for resistors with capacity reducing means.  
64, for resistors with electrical shields.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 32+ for electrical conductors with anti-inductive structure; and especially subclasses 33+ for conductor transposition.  
307, Electrical Transmission or Interconnection Systems, subclasses 89+ for anti-inductive means to prevent or modify the coupling between electrical systems.  
336, Inductor Devices, for inductor devices of the passive type.

**62** This subclass is indented under subclass 61. Subject matter wherein the resistor includes an elongated resistance element formed as two or more continuous closed coils or loops as a spiral, helix, or toroidal winding as defined in subclass 296 below, together with additional structure or arrangement of the coils or loops for reducing or eliminating the inductance or the effect thereof of the coils or loops.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 296+, for resistors generally with helical or wound resistance elements.

**63** This subclass is indented under subclass 62. Subject matter, wherein the helical or wound resistance element is doubled on itself, the bight being at one end of the winding and the doubled portions of the resistance element being disposed side by side in parallel and extending towards the other end in a helical or wound pattern.

**64** This subclass is indented under the class definition. Subject matter including a barrier or screen for shielding at least a part of the resistor device from external electrical, magnetic, or electro-magnetic fields, or for protecting parts of the device from such fields originating in another part of the device, or for preventing the resistor device from emanating such fields or waves containing such fields.

- (1) Note. A fixed resistor with a casing or housing claimed as an electrical shield or equivalent terminology is classified here, and not in subclasses 226+ below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 60, for resistors having means to reduce or eliminate capacity of the effect thereof within the resistor.  
61+, for resistors having means to reduce or eliminate inductance or the effect thereof within the resistor.  
266+, for resistors generally with casings or housings not limited by claimed subject matter to electric shielding. See also (1) Note above.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 35+ for electrically shielded electrical conductors and insulators; or electrical shields or screens not classifiable in other main classes. See also the Search Notes under this subclass.  
334, Tuners, subclass 85 for tuners with electric and/or magnetic shielding or housing means.

- 336, Inductor Devices, subclasses 84+ for inductor devices with electric and/or magnetic shielding means.
- 65** This subclass is indented under subclass 64. Subject matter wherein the resistor is of the mechanically variable type as defined in subclass 68 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 68+, for mechanically variable resistors generally.
- 184, for mechanically variable resistors whose contact slides along in contact with the element together with a casing or housing, and not limited by claimed subject matter to electrical shielding.
- 199, for a mechanically variable resistor generally, with a casing or housing not limited by claimed subject matter to electrical shielding.
- SEE OR SEARCH CLASS:
- 336, Inductor Devices, subclass 87 for adjustable inductive devices with electric and/or magnetic shielding means.
- 66** This subclass is indented under the class definition. Resistors which when inserted in an ignition circuit are particularly well adapted for the suppression of undesired currents in the circuits, which would otherwise produce electrical disturbances, and are characterized by having usually a heavy ceramic insulation casing, a heavy granular bonded mixture as the material for the resistance element incased in the insulating casing, and diverse quick detachable terminals as one being the plug type and the other being of the socket type.
- (1) Note. For classification here the background or use must be an ignition circuit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 64+, for resistors with electrical shields.
- SEE OR SEARCH CLASS:
- 123, Internal-Combustion Engines, subclass 148 for high tension ignition circuits for internal combustion engines.
- 67** This subclass is indented under the class definition. Subject matter wherein the resistor is combined with some other nonelectrical device or structure, for example, of a mechanical or chemical type, having an added purpose or independent utility other than to perfect the resistor, and not otherwise classifiable.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 2+, for strain gauge type resistors together with the structure or device broadly wherein the strain is to be determined.
- 13+, for resistors with a condition sensing actuator; especially subclass 32 for a resistor actuated by a compass; subclass 33 for a resistor actuated by a float; and subclass 37 for a resistor actuated by vehicle tire inflation pressure.
- 50, for a resistor mounted on wheels or vehicles.
- 277, for a resistor with protecting structure spaced from the element or terminal.
- 315+, for a resistor with mounting or supporting means.
- 334, for resistors electrically connected to other electrical devices, and not otherwise classifiable.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclasses 50+ for electrical resistance heaters.
- 68** This subclass is indented under the class definition. Subject matter including a resistance element together with structure for changing a dimension of the resistance element or the effective portion of the resistance element between terminals, as a change in the cross-sectional area or an increase in length of the portion of the resistance element between the terminals; and/or wherein the resistance element is readily adapted or at least adapted for such change in a dimension; or including structure permitting a ready change in the position or point of electrical connection of one or more of the terminals on the resistance element to cause a different portion of the element to be in electrical circuit between the terminals; or including conducting structure which adjustably short-circuits a portion of the resistance element between terminals; or including

switching structure which alters the resistance portion of the resistance element in electrical circuit between terminals or which changes the circuit relationship of the resistance element and other resistance elements or which permits the resistance elements to be changed in or removed from the circuit; the result in any of the above being a change in the resistance value between the resistance terminals or the terminals in the circuit including the resistance element; or wherein the resistance element is adapted for or combined with structure for mechanically changing in some manner the resistance element or the combination including the resistance element; or including any other means or adaption of the resistance element or elements for mechanically changing an arrangement of or effecting a mechanical change in the resistance element or elements to achieve the above mentioned result.

- (1) Note. The change in resistance value as stated above is the result of or involves some mechanical change or adjustment on or in the resistance element or terminals, which includes switching of the terminals. The resistance value may be changed otherwise as by change in temperature, electric current therethrough, or voltage applied thereof. This subject matter is classified above, a field of search for such subject matter being given below.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 1, for coherer type resistors.
- 2+, for strain gauge type resistors.
- 7+, for resistors whose resistance value is temperature compensated.
- 12, for resistors which are actuated by a magnet through a housing or partition.
- 13+, for mechanically adjustable resistors which are combined with structure which senses a change in a condition and converts this change into a mechanical adjustment which is applied to the mechanically adjustable resistor to effect a mechanical adjustment therein with a resulting change in resistance value; or for resistors which have the property of changing their resistance value in response to changes in associated conditions to

which the resistors are subjected, such as subclasses 15+, for photoconductive resistors; subclasses 20+, for current and/or voltage responsive resistors; subclasses 25+, for resistors responsive to ambient temperature; subclass 32, for resistors responsive to a magnetic field or compass; subclass 33, for resistors with a float actuator; subclasses 34+ for resistors with gas, vapor, or moisture absorbing or collecting; subclasses 36+ for fluid or gas pressure actuated resistors; subclasses 43+ for resistors gravity stabilized or with an inertia actuator; and subclass 47 for force actuated resistors.

- 60, for resistors with capacitance reducing means.
- 61+, for resistors with inductance reducing means.
- 64+, for resistors with electrical shielding.
- 66, for ignition interference suppressor type resistors.

**SEE OR SEARCH CLASS:**

- 200, Electricity: Circuit Makers and Breakers, for electrical circuit makers and breakers, per se.
- 323, Electricity: Power Supply or Regulation Systems, subclasses 293+ and subclasses 364+ for regulation systems including a resistor and subclasses 340+ for regulation systems including tap changing.
- 329, Demodulators, subclass 371 for a coherer type amplitude modulation demodulator.
- 333, Wave Transmission Lines and Networks, subclass 81 for attenuators, which may be variable.
- 336, Inductor Devices, appropriate subclasses, for adjustable inductor devices.
- 361, Electricity: Electrical Systems and Devices, subclasses 277+ for variable capacitors.
- 439, Electrical Connectors, appropriate subclasses, for electrical connectors.
- 455, Telecommunications, subclasses 120+ and 150.1+ for radio transmitter and receiver tuners.

- 69** This subclass is indented under subclass 68. Subject matter wherein a musical instrument playing key (usually an organ key) is linked with the mechanically adjustable or variable part of the resistor to change the resistance value in accordance with the depression of the key.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 153, for mechanically variable resistors operated by a pedal or treadle.

SEE OR SEARCH CLASS:

- 84, Music, subclasses 1.01+ for electrical tone generation and music instruments with electric translating devices.

- 70** This subclass is indented under subclass 68. Subject matter including a lamp socket together with a resistor as defined in subclass 68 positioned within the socket, or directly on and in engagement with the surface of the socket, and in circuit with the terminal or terminals of the socket.

- (1) Note. The lamp socket to receive the lamp is usually of the type classifiable as such in Class 439, Electrical Connectors. Usually when structure in addition to that classified in Class 439 is recited, as relating to Class 240, Illumination, or to Class 340, Communications: Electrical, classification is not in this subclass (70) or in Class 439, but in the more comprehensive subclass. See the Search Notes under Classes 313 and 439 for a statement of the classification lines between Class 439 and other classes relating to lamp bases and sockets. The resistor must be intimate relationship with the socket as being contained therein or in a surface recess for classification in this subclass (70). A mere electrical connection between the resistor and the socket or a remote mounting of the resistor on the socket is not sufficient for classification here. Subclasses 315+, provides for resistors with mounting or supporting means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 184, and 199, for mechanically variable resistors in housings generally.  
215, for resistors generally with a switch.  
219, for resistors generally mounted in or on a lamp socket. See also the Search Notes under this subclass for a more extended field of search for this subject matter.  
220, for resistors generally in a detachable electrical connector.

- 71** This subclass is indented under subclass 70. Subject matter wherein the resistor includes (1) two or more separate and distinct masses, including grains, of resistance material, or (2) a distinct and separate mass of resistance material and a mass of conductive material are in exterior surface engagement with one another, together with means for varying the surface engagement pressure to vary the contact resistance between the engaging surfaces, i.e., the resistor is of the type defined in subclass 99 below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 99+, for mechanically variable resistors whose surfaces are pressed together generally. See also the Search Notes under this subclass for field of search for this subject matter.

- 72** This subclass is indented under subclass 70. Subject matter wherein the resistor, a plurality of otherwise electrically separate conducting structures, are each electrically connected to an elongated resistance element along its length, and a terminal movable among the conducting structures to constitute a contact on such structures as defined in subclass 185 below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 185+, for mechanically variable resistors generally with an intervening connector between the contact and element, e.g., taps. See also the Search Notes under this subclass for a field of search for resistors of this type.

- 73** This subclass is indented under subclass 70. Subject matter wherein the resistor, a movable contact, pivots about an axis to slide in a circular path along a resistance element as defined in subclasses 162+ below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
162+, for mechanically variable resistors where the contact is angularly slidable on a resistance element. See also the Search Notes under this subclass for a field of search for resistors of this type.
- 74** This subclass is indented under subclass 70. Subject matter wherein in the resistor, the contact terminal, moves in a straight path over or along a resistance element, the contact terminal remaining in contact with the element as it slides along as defined in subclass 176 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
176, for mechanically variable resistors wherein the contact is rectilinearly slidable over the resistance element. See also the Search Notes under this subclass for a field of search for resistors of this type.
- 75** This subclass is indented under subclass 68. Subject matter including structure, such as a wiper, for removing dirt or other material from the resistor, as from the contacting surfaces of the resistance element or the contact movable thereon.
- 76** This subclass is indented under subclass 68. Subject matter including two or more physically similar resistors of different resistance values together with means effecting or permitting a change or substitution of one resistor for the other in an associated electrical circuit, i.e., both terminals of one resistor are separable from the electrical circuit and the terminals of the other resistor are connected in the electrical circuit in a corresponding position.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
77, for plug boxes.
- 185+, for mechanically variable resistors of the tap type.
- 200+, for mechanically variable resistors generally including a switch for effecting a change in the resistance value.
- 77** This subclass is indented under subclass 68. Subject matter including a base or panel having a single resistor or a plurality of resistors mounted thereon or in a box or housing, the panel constituting a cover therefor, together with terminals mounted on the panel and electrically connected along the length of a single resistor or to the ends of the plurality of resistors, the terminals having openings therein or providing openings; and including also terminal plugs adapted to be removably inserted in the openings to short-circuit respective resistors or portions thereof, or to connect the resistors in series or parallel.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
92+, for mechanically variable resistors including means adjustably short-circuiting the resistance element.  
185+, for tap type mechanically variable resistors.  
200+, for a mechanically adjustable resistor combined with a switch.  
215, for resistors generally combined with switches.
- SEE OR SEARCH CLASS:  
174, Electricity: Conductors and Insulators, subclasses 50+ for boxes and housings generally for electrical devices.  
361, Electricity: Electrical Systems and Devices, subclasses 627+ for distribution or control panel board.
- 78** This subclass is indented under subclass 68. Subject matter wherein a resistor or plurality of resistors as there defined is combined with or includes an electric switch in a common electric circuit, the switch being effective to reverse the electric current at the output terminals of the resistor with respect to the current applied at the input terminals.
- (1) Note. Usually the resistor and switch have a common actuator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 200+, for mechanically adjustable or variable resistors combined with switches in general. See the Search Notes under this subclass for a more extended field of search for a variable resistor combined with a switch.
- 215, for a fixed resistor combined with a switch. See also the Search Notes under this subclass for a more extended field of search for this combination.

SEE OR SEARCH CLASS:

- 318, Electricity: Motive Power Systems, subclasses 293+ and 300 for motor reversing systems which involve reversal of the armature or field current.

**79** This subclass is indented under subclass 68. Subject matter wherein the resistance element is wound on a core, and is adapted to be unwound therefrom as on a second core to change the value of the resistance between terminals.

- (1) Note. Examples of subject matter here include a resistor whose element is wound from an insulating core to a conducting core, the conducting core short-circuiting the portion of the resistance element wound thereon; and a resistor whose element is wound between two cores with a contact slidably engaging the portion of the element between cores.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 150+, for variable resistors in which the resistance element moves.
- 296+, for helical or wound resistors generally.

SEE OR SEARCH CLASS:

- 242, Winding, Tensioning, or Guiding, subclasses 370+ for a general use reeling device which unwinds and rewinds the same material.
- 334, Tuners, subclass 38 for a tuner having a reactance element which is adapted

to be wound or unwound from a core or support.

- 336, Inductor Devices, subclass 15 for inductor devices with coil winding and/or unwinding.

**80** This subclass is indented under subclass 68. Subject matter wherein the resistance element is a liquid, the resistance value of the resistor being changed as by modifying the dimensions of the element or the spacing between terminals or electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 27, for a resistor with a liquid element whose resistance value is responsive to ambient temperature; subclass 38 for such resistors whose resistance value is responsive to fluid or gas pressure; and subclass 44 for such resistors which are gravity stabilized or with an inertia actuator.
- 56, for a resistor whose element constitutes a circulating cooling medium.
- 88, for penetrating type resistors with a powdered resistance element.
- 100, for compressible type resistors with a granular resistance element.
- 114+, for deformable variable resistors. 156, for variable resistors having a liquid contact movable over the resistance element.
- 222, for a resistor generally with a liquid element.
- 223, for a resistor generally with a granular or powdered element.

SEE OR SEARCH CLASS:

- 323, Electricity: Power Supply or Regulation Systems, subclass 296 for regulation systems having a liquid resistor.
- 329, Demodulators, appropriate subclasses for demodulator with liquid element.

**81** This subclass is indented under subclass 80. Subject matter wherein one of the terminals or electrodes is removable from the liquid resistance element, as by raising the electrode from the liquid element or by lowering the level of the liquid element from the electrode, thus to make and break the circuit between the liquid element and the electrode.



SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 173, for a resistor whose contact is angularly slidable on the resistance element and separable from the element; and subclass 178 for such resistors whose contacts are rectilinearly slidable.
- 198, for a mechanically variable resistor with a switch actuated by the resistor actuator.

- 82** This subclass is indented under subclass 80. Subject matter including an insulating barrier or curtain which is positioned transversely to the current path through the liquid element between the electrodes, the barrier or curtain being adjustable in and out of this current path to change the effective length of the current path between the electrodes and/or the effective cross-sectional area of the path between the electrodes.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 114, for deformable resistors generally.

- 83** This subclass is indented under subclass 80. Subject matter wherein one of the terminals or electrodes in the liquid element is movable with respect to another electrode or terminal in the element to effect a change in the distance between the electrodes to change the resistance value between the terminals.

- (1) Note. For classification here there must be a change in the physical spacing of the electrodes. A mere change in the effective spacing of the electrodes in the resistance element as by adjusting the submersion of tapered electrodes in the liquid resistor is not classified here (see search note below).

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 86, for a liquid resistor whose liquid level is adjustable on the electrodes. See also (1) Note above.
- 87+, for a mechanically variable resistor whose contact is adjustably inserted into a nonliquid resistance element.

- 137, for resistors wherein a plurality of contacts are movable over a single resistance element.

- 84** This subclass is indented under subclass 83. Subject matter wherein a plurality of resistors as there defined have an electrode of one mechanically linked with a corresponding electrode of another so that the two electrodes move in unison through the liquid element of the respective resistors; or wherein a single resistor as there defined includes a plurality of electrodes which are mechanically linked together to move in unison through the liquid element of the resistor toward and away from another electrode of the resistor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 130+, plural ganged resistors of the type where a contact moves over the length of the resistance element.

- 85** This subclass is indented under subclass 83. Subject matter wherein at least one of the electrodes is rotatable to effect the change in distance through the liquid element to another electrode.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 32, for a resistor whose value changes in response to a magnetic field.

- 86** This subclass is indented under subclass 80. Subject matter including structure for raising or lowering the level of the liquid resistance element with respect to the electrodes inserted in the liquid element; or including structure for moving or permitting movement of the electrodes up and down in the liquid element.

- (1) Note. This subclass includes resistors whose effective electrical length between electrodes is varied by adjusting the submersion of electrodes in a liquid. See search notes below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 33, for float actuated resistors.
- 55+, for resistors with cooling liquid circulation.

83+, for resistors whose electrodes are relatively movable in the liquid element to change the distance between the electrodes through the element, and see the (1) note under that definition.

**SEE OR SEARCH CLASS:**

323, Electricity: Power Supply or Regulation Systems, subclass 296 for regulation systems having a liquid resistor.

**87** This subclass is indented under subclass 68. Subject matter wherein a contact extends into the resistance element and is movable therein to vary the spacing through this resistance element between this contact and another contact, thus to vary the resistance value between the contacts.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

80+, for mechanically variable liquid resistors.  
 92+, for mechanically variable resistors whose resistance elements are adjustably short-circuited.  
 322, for resistors with a driven or pressed terminal.  
 331, for resistors generally whose element surrounds one of the terminal.

**88** This subclass is indented under subclass 87. Subject matter wherein the resistance element is granular or powdered, the contact usually being formed as a pin or other elongated object to penetrate into the powdered or granular element.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

100, for compressible type granular resistors.  
 223+, for resistors generally with granular or powdered elements.

**89** This subclass is indented under subclass 68. Subject matter wherein, in the variable resistor, a definite mathematical relationship exists between movement of the resistor actuating means and the value of the resistance appearing across the resistor terminals.

(1) Note. Examples of the relationship appearing in this subclass are sinusoidal

and logarithmic. A mere tapered variable resistor is not classified here (see search this class, subclass notes below), unless the definite mathematic relationship that the taper produces is recited in the specification or claims.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

135, for mechanically variable resistors with zero setting or phasing.  
 138+, for mechanically variable resistors having a tapered element. See also (1) Note, above.  
 217+, for tapered resistors generally.

**SEE OR SEARCH CLASS:**

235, Registers, subclasses 61+ for resistors having a mathematical characteristic in a calculator.  
 323, Electricity: Power Supply or Regulation Systems, subclass 298 and 354 for periodically varied impedance systems.  
 333, Wave Transmission Lines and Networks, subclass 81 for attenuators.  
 336, Inductor Devices, subclass 224 for inductors having nonuniformly spaced turns. See also the Search Notes thereunder for a more extensive search for this subject matter.  
 708, Electrical Computers: Arithmetic Processing and Calculating, subclasses 800+ for resistors having a mathematical characteristic in an electrical calculator.

**90** This subclass is indented under subclass 89. Subject matter wherein the resistance element is formed as a surface having significant width as well as length, together with a contactor relatively movable not only lengthwise but crosswise over the surface of the element.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

116, for electric motor driven resistors.

**SEE OR SEARCH CLASS:**

363, Electric Power Conversion Systems, subclass 140 for impedance type converters.

- 91** This subclass is indented under subclass 89. Subject matter including a mechanical linkage in or an arrangement of the resistor actuator producing some peculiar operating characteristic to contribute to the mathematical relationship.
- (1) Note. Examples of subject matter present here include a cam and follower linkage or an eccentric mounted contact movable over an annular resistance element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
116, for electric motor driven resistors.
- SEE OR SEARCH CLASS:  
363, Electric Power Conversion Systems, subclass 140 for impedance type converters.
- 92** This subclass is indented under subclass 68. Subject matter wherein the resistor includes an elongated element together with conductive structure connected at spaced points being adjustable along the length of the element; or wherein the resistance element is bent upon itself so that two points along the length of the element adjustably contact electrically to effectively eliminate electrically the portion between the two points from the electric path through the resistor, i.e., a variable portion of the resistance element is shunted; or wherein a conducting mass such as a liquid is adjustably connected along the length of the element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
77, for adjustable resistors of the plug box type.  
79, for mechanically variable resistors with element winding and/or unwinding.  
87+, for adjustable resistors wherein a contact adjustably penetrates into the element.  
118+, for mechanically variable resistors wherein a contact moves over the length of the resistance element; and especially subclass 120, for such resistors whose element is adjustably shunted by an additional resistor; and subclasses 122+, for such resistors with coarse and fine resistance elements.
- SEE OR SEARCH CLASS:  
323, Electricity: Power Supply or Regulation Systems, subclass 353, for regulation systems.
- 93** This subclass is indented under subclass 92. Subject matter in which the resistance element is formed as a compressible spring (usually helical), the convolutions of the spring coming into contact upon compression to short-circuit at least a portion of the length of the resistance element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
99+, for compressible type variable resistors generally.  
114+, for mechanically variable resistors whose elements are deformable.
- 94** This subclass is indented under subclass 92. Subject matter including a conducting liquid as the resistance element short circuiting means, a portion of the elongated resistance element being adjustably inserted in the conducting liquid to short-circuit the portion of the element so inserted, or the conducting liquid being adjustable along any intervening structure, if present, such as taps.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
80, for a mechanically variable resistor whose element is a liquid.  
151, for a mechanically variable resistor whose element moves with reference to a liquid contact.  
156, for a mechanically variable resistor having a liquid contact adjustable along the length of the resistance element.  
222, for liquid resistors generally.
- 95** This subclass is indented under subclass 92. Subject matter wherein a plurality of otherwise electrically separate conducting structures are each electrically connected to the resistance element along its length, the short circuiting structure being adjustably connected between these conducting structures.

- (1) Note. The separate conducting structures themselves may be pressed into contact with one another to form in themselves the short circuiting means.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 94, for a tap type resistor whose element is adjustably short-circuited by a conducting liquid.  
185, for variable resistors of the tap type.  
198, and 200+, for variable resistors with switches.

**96** This subclass is indented under subclass 92. Subject matter wherein a flexible elongated conductor has an end electrically connected to a terminal of the resistance element or to the element itself at a point along its length, the conductor being adapted to be pressed into engagement with and along the length of the elongated conductor, the engaging portion extending from the connection to the resistance element and progressively increasing as the strip is pressed into contact with the element, whereby an adjustable length of the element is shunted by the conductor.

- (1) Note. Usually the flexible contact or the element has a curved surface to space adjacent portions of the contact and element until pressed into engagement.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 95, for a tap type resistor wherein a flexible short circuiting contact strip progressively engages along the taps of a resistance element.  
154, for a mechanically variable resistor where a flexible conductive strip separates the resistance element and the contact movable along the element.  
155, for a variable resistor with a contact which rocks along the resistance element.  
157, for a variable resistor with a contact which rolls along the element.

**97** This subclass is indented under subclass 92. Subject matter wherein the resistance element has portions extending in parallel spaced relationship and a conducting bridge extending

between the parallel portions being movable lengthwise therealong.

- (1) Note. In this subclass the bridging element shorts a single resistance element, while in subclasses 125+ a plurality of resistance elements are connected by a unitary movable bridge.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 125+, for variable resistors wherein a plurality of resistance elements are bridged by a unitary movable contact. See also (1) Note above.

**98** This subclass is indented under subclass 68. Subject matter including structure associated with the mechanically adjustable portion of the resistor for retarding the adjustment of the resistor over at least a portion of the adjustment range, or for eliminating or reducing vibration.

- (1) Note. Examples of motion damping means are fans, speed responsive brakes, or damping liquids. The subject matter of this subclass includes structure for slowing down the desired mechanical adjustments of the resistor as to prevent hunting of the resistor. Structure for eliminating or offsetting or otherwise controlling the effect of vibration in photo-conductive resistors is in subclass 16 above, while subclasses 315+ provides for resistors generally with anti-vibration supports.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, for photo-conductive resistors with vibration control. See also (1) Note above.  
43+, for resistors responsive to a gravity stabilized or inertia device.  
80+, for mechanically variable resistors with a liquid element.  
171, for variable resistors with a contact slidable on the resistance element, the contact having plural element engaging portions, which may reduce the effect of vibration.  
315+, for resistors generally with anti-vibration supports. See also (1) Note above.

## SEE OR SEARCH CLASS:

- 188, Brakes, subclass 86 for fluid and mechanical internal resistance brakes including dashpots.
- 200, Electricity: Circuit Makers and Breakers, subclass 34 for electrical switches with dashpots.

**99**

This subclass is indented under subclass 68. Subject matter wherein (1) two or more separate and distinct masses, including grains, of resistance material or (2) a distinct and separate mass of resistance material and a mass of conductive material are in exterior surface engagement with one another, together with means for varying the surface engagement pressure to vary the contact resistance between the engaging surfaces.

- (1) Note. The masses may be layers of solids, or granular, or fibrous such as steel wool, or coated materials. The conducting mass may be a terminal.
- (2) Note. In this subclass the resistance value is varied by the change in contact pressure between the two masses. While in subclasses 2+ and 114+ the cross section area or length of the element itself may be changed by compression to vary the resistance value.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1, for coherer type resistors.
- 47+, for force actuated resistors.
- 51+, for resistors with heat dissipating projections, such as vanes.
- 70+, for a lamp socket having a compressible type resistor therein or thereon.
- 93, for a compressible spring type variable resistor whose element is adjustably short-circuited.
- 114+, for a mechanically variable resistor whose element is deformable to vary the resistance value. See also (2) Note above.
- 204+, for fixed resistance elements formed of layers piled or stacked between terminals.

## SEE OR SEARCH CLASS:

- 323, Electricity: Power Supply or Regulation Systems, subclass 295 for regulation systems including a pressure variable resistor.

**100**

This subclass is indented under subclass 99. Subject matter wherein at least one of the resistance masses is granular or powdered in form.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1, for coherer type resistors.
- 88, for penetrating type resistors having granular resistance elements.
- 199, for a mechanically adjustable resistor generally with a casing or housing.
- 223+, for granular or powdered resistors generally.

## SEE OR SEARCH CLASS:

- 330, Amplifiers, subclass 61 for carbon microphone type amplifiers.

**101**

This subclass is indented under subclass 99. Subject matter wherein two or more masses of resistance material are formed as wafers or discs and are disposed on top of one another to form a pile, the engagement pressure being applied axially along the pile.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 115, for a mechanically variable resistor generally whose resistance element is formed as a pile.

**102**

This subclass is indented under subclass 101. Subject matter together with a contact which is adjustable along the length of the pile to permit a varying portion of the pile to be connected in the circuit associated with the contact.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 48, for plural separate diverse resistors.
- 118+, for a mechanically variable resistor generally having a contact electrically adjustable over the length of the resistance element.

- 103** This subclass is indented under subclass 101. Subject matter including an electromechanical transducer such as an electric motor or a magnetic relay, the moving part such as the armature of the transducer being mechanically linked with the piles to compress or to release the pressure on the piles upon application of electric energy to the transducer.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 116, for mechanically variable resistors generally operated by an electric motor or relay.
- 104** This subclass is indented under subclass 103. Subject matter including two electromagnetic operators each applying a positive compressive or releasing force to a respective end of the pile, or a linkage connected with a single electromagnetic operator for applying a positive compressive or releasing force to both ends of the pile.
- (1) Note. For classification here an actual force must be applied to both ends of the pile. A mere abutment at one end which exerts a holding force in opposition to the force applied at the other end by the relay or motor is not sufficient for classification here, but elsewhere under subclass 103.
- 105** This subclass is indented under subclass 103. Subject matter including a biasing spring usually disc shaped coaxially disposed at an end of the pile between the pile and the electromagnetic operator for exerting a compressive or releasing force on the pile in opposition to the force applied by the electromagnetic operator.
- (1) Note. The subject matter here usually includes a relay whose armature acts to compress or release the pile, the diaphragm spring being coaxially disposed between the armature and the pile with its center acting on the pile and supported entirely around the periphery or at, at least three peripheral points.
- 106** This subclass is indented under subclass 103. Subject matter including structure such as a screw for applying a compressive force on the pile in addition to that applied by the electromagnetic operator, or on the spring, if any, which exerts a pressure releasing force on the pile in opposition to that exerted by the electromagnetic operator, the structure being adjustable as to compensate for surface wear in the piles during use.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 109, for compressible pile type resistors generally with an initial pressure adjustment.
- 107** This subclass is indented under subclass 101. Subject matter including a retaining or positioning magnet for locking or holding the pressure controlling means in a predetermined position.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 12+, for resistors wherein a movable magnet actuates the resistor through a housing or partition.  
 103+, for compressible pile type resistors whose pressure controlling means are actuated by an electromagnet.  
 189, for tap type variable resistors including a magnetic holder for the controller arm.
- 108** This subclass is indented under subclass 101. Subject matter including structure mechanically linked with the means for varying the engagement pressure of the contact surfaces, and peculiarly adapted for operation by the foot or knee, as by being operable by a push, and including structure such as a spring for returning to the initial position upon removal of the pushing force, and including a portion shaped to facilitate engagement with the foot as by being shaped like the sole of the foot or having a substantially flat foot engaging surface.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 153, for resistors having a contact movable along an elongated resistor, and operated by a pedal or treadle.  
 215, for a fixed resistor and switch combination which may be operated by a pedal or treadle.

## SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 512+ for foot operated linkage systems; subclass 515 for knee operated linkage systems; and subclasses 560+ for pedal type levers.

- 109** This subclass is indented under subclass 101. Subject matter including structure such as a screw for applying a compressive force to the pile in addition to that applied by the structure normally varying the resistance value of the pile as by compression, the first mentioned structure being adjustable as to compensate for surface wear in the piles during use.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

106, for pile type resistors with an electromagnetic operator and including an initial pressure adjustment.

- 110** This subclass is indented under subclass 101. Subject matter including a switch, which is operatively linked with the means for varying the engagement pressure of the engaging surfaces.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

198, for variable resistors generally and a switch actuated by the resistor actuator.  
200+, for variable resistors combined with switches generally.

- 111** This subclass is indented under subclass 101. Subject matter wherein a layer or coating of conducting material is provided between two adjacent wafers of the pile.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

205, for a resistor whose element is piled or stacked in layers between terminals with an intervening conducting layer.

- 112** This subclass is indented under subclass 101. Subject matter wherein normally only a portion of the facing surfaces of the pile discs are in actual physical contact, the discs being flexible or resilient, the means for varying the engagement pressure and when actuated increasing

and/or decreasing the portion of the facing surfaces in actual physical contact.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

96, for a mechanically variable resistor having a contact strip progressively pressed along the resistance element.  
114+, for mechanically variable resistors whose elements are deformable.

- 113** This subclass is indented under subclass 101. Subject matter wherein the means for varying the contact pressure includes a resilient spring in the linkage which transmits the pressure to the pile or on the end of the pile opposite to that where the compressive force is applied, the spring serving to progressively apply the contact pressure to the pile.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

108, for pile type compressible resistors which are operated by a pedal or treadle, and which include a resilient spring in the pressure applying linkage.

- 114** This subclass is indented under subclass 68. Subject matter including a flexible or deformable unitary mass of resistance material together with structure for modifying the shape of the mass, as by increasing the length or reducing the cross sectional area of the mass between terminals, to change the resistance value between the terminals.

(1) Note. The mass may be granular. However, where the resistance value is changed by changing the surface pressure between the grains classification is in subclass 100 above. In this subclass (114) the shape of the resistance element itself is changed to modify the resistance value between the terminals.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

2+, for strain gauge type resistors.  
99+, for variable resistors whose surfaces are pressed together, variation in the pressure changing the resistance value between terminals.

**115** This subclass is indented under subclass 68. Subject matter wherein the element is formed of a plurality of layers of resistance material which layers are piled or stacked transversely to the direction of current flow through the resistance element, i.e., so that the current flowing through the resistance element will flow from pile to pile.

- (1) Note. Usually the resistance element is formed of a plurality of plates or disks of resistance material which are connected together directly or through other plates or disks of conductive material. The plates or disks are piled transversely along the length of the element, as between the resistance terminals or transversely to the path of movement of a contact moving along the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 7+, for a pile type resistor whose resistance value is temperature compensated.  
52, for a pile type resistor with heat dissipating projections.  
101+, for pile type compressible resistors.  
204+, for fixed resistors whose elements are formed in layers piled or stacked between terminals.

SEE OR SEARCH CLASS:

- 361, Electricity: Electrical Systems and Devices, subclasses 117+ for high voltage dissipators, per se, wherein the discharge path may be resistive disks or buttons.  
428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer stock material product, note subclass 411 for a plural layer material, one layer being of resistive material and one or more layers being conductive, so as to constitute one or more terminals; see especially subclasses 457+.  
442, Fabric (Woven, Knitted, or Nonwoven Textile or Cloth, Etc.), subclass 117 for a coated or impregnated fabric which is electrical insulating or conductivity reducing.

**116** This subclass is indented under subclass 68. Subject matter including an electromechanical transducer such as a electric motor or a magnetic relay, the moving part such as the armature of the transducer being mechanically linked with a mechanically moving operating part of the resistor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 12+, for a resistor actuated by a movable magnet through a housing or partition.  
32, for a resistor whose resistance value is responsive to a magnetic field.  
36+, for resistors which are fluid or gas pressure actuated, and including variable resistors operated by fluid motors.  
98, for a mechanically variable resistor with a motion dampening means such as a dashpot.  
103+, for a pile type compressible resistor with an electromagnetic operator; and subclass 107 for such resistors with an electromagnetic holder.  
189, for a mechanically variable resistor of the tap type including a magnetic holder.

SEE OR SEARCH CLASS:

- 310, Electrical Generator or Motor Structure, appropriate subclasses, for electric motor structure.  
318, Electricity: Motive Power Systems, appropriate subclasses, for motor control systems including variable resistors.  
334, Tuners, subclasses 17+ for tuner units with an electromagnetic operator.  
335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 209+ for magnets and electromagnets.

**117** This subclass is indented under subclass 68. Subject matter wherein a resistor whose element is usually a cylindrical helix presents a cylindrical helical contact portion of one turn or less on the surface of the element or a cylindrical helical row of taps of one turn or less electrically connected to the resistance element to a linear contacting member or linear row of taps extending alongside and coextensive with



the helical contact portion or row of taps, the helical contact portion or row of taps being rotatable to move the point of contact along the length of the helical contact portion or helical row of taps and along the length of the linear contacting member or linear row of taps; or wherein a resistor whose element is usually a cylindrical helix presents a linear contact portion on its surface or a linear row of taps electrically connected with the resistance element to a cylindrical helical contacting member of one turn or less or to a cylindrical helical row of taps of one turn or less or to an elongated flat twisted contacting member, the twist being through 180° or less, the contacting member or helical row of taps extending alongside and coextensive with the linear contact portion or linear row of taps, and being rotatable to move the point of contact along the length of the linear contact portion or linear row of taps and along the length of the helical or twisted contacting member or along the length of the helical row of taps.

- (1) Note. In this subclass the point of contact moves along the length of both contacting members upon rotation of one of the members, while in subclasses 143+ below the point of contact moves along one of the members, namely the helical resistance element and remains fixed on the other member, namely the contact upon rotation of the helical resistance or the contact.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 143+, for a variable resistor whose contact moves along the turns of a helical resistance element. See also (1) Note above.

- 118** This subclass is indented under subclass 68. Subject matter wherein the resistance element has an elongated shape, or a plurality of resistance elements are connected in a series, which shape or series may be straight or curved, together with at least two conducting terminals, electrically connected to the element by direct connection or through one of a plurality of intervening connecting structures each electrically connected to the element or series of elements along the length, one of the terminals forming a contact for the element and being

movable along the length of the element or selectively among the plurality of intervening connecting structures to constitute a contact or contacts for the element or intervening portion to enable an adjustable portion of the length of the element or elements to be electrically connected between the terminals, the resistance value of the portion thus depending on the position or setting of the movable terminal or terminals.

- (1) Note. The path of motion of the terminals need not be fixed for classification here.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 70+, for a mechanically variable resistor in or on a lamp socket.  
 117, for mechanically variable resistors having slidable helical and linear contacts.  
 200+, for a variable resistor including a switch.  
 202, for movable contact structure for variable resistors and not otherwise classifiable.  
 215, for a fixed resistor together with a switch.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, especially subclass 4, 6+ and 16 for multiple circuit control switches with movable contacts.

- 119** This subclass is indented under subclass 118. Subject matter including a light which is turned on and off in accordance with the adjustment of the movable contact, or whose intensity of illumination is dependent on the adjustment of the movable contact.

- (1) Note. Usually the subject matter here includes a switching rheostat, the light indicating whether the switch is open or closed; or a rheostat wherein the illumination of the light varies with the setting of the rheostat.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 196, for mechanically variable resistors generally with a resistor actuator posi-

tion indicator or with a resistor setting indicator.

**SEE OR SEARCH CLASS:**

340, Communications: Electrical, subclass 252 for pilot lights responsive to the condition of electrical apparatus; and subclasses 366+ for visual electric signaling generally.

**120** This subclass is indented under subclass 118. Subject matter wherein an additional resistor is connected in parallel with a portion (less than the entire length of the resistance element), at least one of the connections to the resistance element being adjustable along the length of the element and/or the resistor being adjustable in resistance value.

- (1) Note. The purpose of this shunting resistor is to modify the resistance value along the length of the element to secure particular relationships (linear or nonlinear) between the movement of the contact and the resistance value appearing across the resistor terminals. See subclasses 89+ for adjustable resistors where a definite mathematical relationship exists between the resistance value across the resistor terminals and movement of the contact, and subclass 121 for adjustable resistors of the movable contact type with structure for securing a linear relationship between the resistance value across the resistor terminals and movement of the contact.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

89+, see (1) Note above.  
121, see (1) Note above.

**121** This subclass is indented under subclass 118. Subject matter including structure which insures the same change in resistance value across the terminals with a given change or movement of the resistor actuator throughout the full operating range of the resistor, i.e., a straight line relationship exists between the value of the resistance across the terminals and the movement of the resistor actuator.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 89+, for mechanically variable resistors wherein a definite mathematical relationship exists between the value of the resistance across the terminals and movement of the resistor actuator.  
120, for a resistor with a contact electrically adjustable over the length of the element, together with an additional resistor which shunts the element at adjustably spaced points, which may connect for nonlinearities.  
135, for a variable resistor of the movable contact type having a zero setting or phasing means.  
138+, for tapered resistors of the mechanically variable type.  
195, for resistors varied by removing or adding material which may give a linear effect.  
202, for movable contact structure.

**SEE OR SEARCH CLASS:**

336, Inductor Devices, subclass 224 for inductors having nonuniform spaced turns which may give a linear effect.

**122** This subclass is indented under subclass 118. Subject matter including two electrically connected resistance elements or a single element having relatively small and large resistance values per unit length along the element or elements, so that greater adjustment of a contact over one of the elements or portions thereof will be necessary to effect a given change in resistance value across the resistor terminals.

- (1) Note. Vernier actuating structure for the movable contact is not classified here, but in subclasses 181 and 202 below.  
(2) Note. The contact may move over one or both resistance elements.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 131, for ganged mechanically adjustable resistors with resistance elements individually adjustable.  
181, for a variable resistor with a contact rectilinearly slidable, the contact

- being operated by a screw as a fine adjustment. See also (1) Note above.
- 202, for movable contact structure for variable resistors, the structure including a vernier mechanism. See also (1) Note above.
- SEE OR SEARCH CLASS:
- 74, Machine Element or Mechanism, subclasses 10+ for radio tuner type shaft operators.
- 123** This subclass is indented under subclass 122. Subject matter wherein the two resistance elements have each a contact movable thereon, the contacts being electrically connected.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 134, for plural resistors individually operated by concentric shafts.
- 124** This subclass is indented under subclass 123. Subject matter wherein some mechanical interlinking exists between the movable contacts, as for example to cause the contacts to move together yet permitting a limited independent vernier adjustment of the fine contact.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 131, for plural mechanically variable resistors whose contacts are ganged, and with additional structure for adjusting individually the resistance values of the respective elements of the resistors.
- 125** This subclass is indented under subclass 118. Subject matter wherein a movable contact structure contacts a plurality of resistance elements or a plurality of series of taps or other contact structure electrically connected with the respective resistance elements, to provide a conducting bridge between the elements where contact is made.
- (1) Note. Subject matter here is usually a single contact bar slidable over the surface of two resistance elements to change the resistance value between terminals at the ends of the respective elements.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 92+, for a variable resistor with an element short circuiting means.
- 130+, for plural resistors having ganged resistor actuators.
- 126** This subclass is indented under subclass 125. Subject matter wherein the elements or the series of taps or other structure connected to the elements are arranged in parallel, i.e., the spacing therebetween is uniform.
- (1) Note. Two circular arrangements of the elements or taps with uniform spacing are considered parallel for classification here.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 97, for a mechanically variable resistor wherein portions of the resistance element are in parallel and a unitary short circuiting bridge movable thereon. See also (1) Note under subclass 97.
- 127** This subclass is indented under subclass 125. Subject matter wherein the resistance elements or series of taps or other structure connected to the elements have a circular shape or arrangement, and lie in a common circle with the bridging contact extending across the circle and rotating about the center.
- 128** This subclass is indented under subclass 118. Subject matter including two or more resistors, each being of the type defined in subclass 118.
- (1) Note. For classification here each resistor must include at least an element and movable contact.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 14, for a resistor whose resistance value is responsive to a plurality of conditions.
- 48, for plural diverse resistors there defined.
- 76, for plural interchangeable resistors of different resistance value.
- 84, for plural ganged liquid resistors.
- 122+, for resistors with coarse and fine resistance elements.

- 137+, for a variable resistor with a single element and a plurality of contacts.
- 320, for plural resistors generally with a support. See also the Search Notes under this subclass for a more extensive field of search for plural resistors.
- 129** This subclass is indented under subclass 128. Subject matter including structure which prevents operation of one resistor until a second resistor has completed a definite cycle of operation, i.e., the first resistor is operated after the operating cycle of the second resistor or is placed in condition to be operated after the opening cycle of the second resistor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 122, for resistors with coarse and fine elements such as vernier.
- 130+, for ganged mechanically adjustable resistors.
- 130** This subclass is indented under subclass 128. Subject matter wherein the contact structures, or the resistance elements if movable, of the respective resistors are mechanically inter-linked to move in unison to adjust together the respective contacts over the length of the resistance elements.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 84, for plural ganged liquid resistors.
- 198, for a variable resistor and a switch actuated by the resistor actuator.
- 131** This subclass is indented under subclass 130. Subject matter, wherein the ganged resistors include structure for changing the value of the resistance presented across the individual resistor terminals in addition to the change in resistance value resulting from operation of the ganged structure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 135, for a mechanically variable resistor with zero setting or phasing.
- 132** This subclass is indented under subclass 130. Subject matter wherein the resistors are of the angularly adjustable contact type, and are disposed behind one another with the contact or element rotation occurring about a common axis; together with an actuating shaft extending along this axis, or with the operating shafts of the respective resistors extending along this axis and including coupling structure to enable these shafts to rotate in unison.
- 133** This subclass is indented under subclass 130. Subject matter wherein the contact, or the element if movable, of each resistor moves in a substantially straight line, each resistor usually being secured to or actuated by a linearly moving rod or shaft.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 158, for a mechanically adjustable resistor including a contact which rolls rectilinearly over the resistance element or taps.
- 176+, for a mechanically adjustable resistor including a contact slidable rectilinearly over the resistance element.
- 194, for a mechanically adjustable resistor of the tap type whose contact is rectilinearly movable.
- 134** This subclass is indented under subclass 128. Subject matter wherein the resistors are arranged in tandem and including shafts which operate the respective resistors, the shafts having a common axis and being at least partly coextensive to surround one another.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 123+, for a resistor having coarse and fine elements, and plural contacts individually operated by concentric shafts.
- 135** This subclass is indented under subclass 18. Subject matter including structure which permits movement or adjustment of the contact relative to the resistance element in addition to the movement or adjustment by the normal adjusting mechanism, to establish a desired preliminary setting of the contact relative to the resistance element, the structure maintaining the selected positioning or adjustment during operation of the normal contact moving mechanism; or including an adjustable stop or abutment for setting the relative position of the contact on the resistance element to provide

zero resistance value between the contact and the end of the element.

- (1) Note. This subclass usually includes structure which permits adjustment of the resistance element relative to its support, or adjustment of the contact with respect of its operating mechanism to establish a desired preliminary setting between the contact and the resistance element.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 120, for a resistor with a contact adjustable over the length of the resistance element, wherein an additional resistor adjustably shunts part of the resistance element; subclass 121 for movable contact resistors with a nonlinearity correction; and subclass 131 for a ganged plurality of movable contact resistors which are individually adjustable.

- 136** This subclass is indented under subclass 118. Subject matter wherein the resistor element has adjustable movable contact taps or terminals which are adapted to be moved along the resistance element and clamped as by a screw in direct contact therewith so that any value of the element resistance may be obtained.

- (1) Note. Subject matter generally found in this subclass consists of a fixed resistor with tap contacts that embrace the resistor and are screw clamped in position. For classification here the contact must be clamped directly to the element. Structure generally for setting the resistance element is classified elsewhere under subclass 118, such as subclass 182, for rectilinearly slidable resistance contacts with a lock.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 77, for variable resistors of the plug box type.  
92+, for variable resistors having adjustable short circuit means.  
182, for variable resistors with a rectilinearly slidable contact including a lock. See also (1) Note above.

- 323, for resistors having terminals tapped along the element.  
325, for resistors with three or more terminals.

**SEE OR SEARCH CLASS:**

- 336, Inductor Devices, subclass 150 for inductors having taps for varying the effective inductance.

- 137** This subclass is indented under subclass 118. Subject matter including a plurality of electrically separate contacts movable over the same resistance element or movable over a series of taps or other intervening structure connected to the same resistance element, or connected to different series of taps or other intervening structures which are connected to the same resistance element.

- (1) Note. For classification here the contacts must be connected to separate terminals or through a circuit other than a mere conductor, such as another resistor. Subclasses 92+ provides for plural contacts which short-circuit a portion of a resistance element, and subclass 171 below provides for a resistor with an angularly movable contact having plural contact portions.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 92+, for a mechanically variable resistor with a resistance element short circuiting means. See also (1) Note above.  
120, for a variable resistor part of whose element is adjustably shunted by a resistor.  
128+, for plural mechanically variable resistors, each resistor including a contact movable over a resistance element.  
136, for a variable resistor whose contact is clamped on the resistance element.  
171, for a resistor having a contact with plural contact portions angularly movable over the resistance element. See also (1) Note above.

- 138** This subclass is indented under subclass 118. Subject matter wherein a physical dimension or characteristic of the resistance element changes in one direction gradually or in a plurality of

discrete progressive steps along the element as recited in subclass 217 below.

- (1) Note. Usually the purpose of this tapered characteristic in a variable resistor is to provide a nonlinear relationship between the change in value of the resistance and movement of the contact arm. Subclasses 89+ above provides for such structure where a definite mathematical relationship exists.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

89+, for variable resistors wherein a definite mathematical relationship exists between the value of the resistance across the terminals and movement of the resistor actuator. See also (1) Note above.

217+, for tapered resistors generally.

- 139** This subclass is indented under subclass 138. Subject matter wherein conductive material is disposed along or over, and in direct engagement with the resistance element to reduce the resistance of the element over a portion of its length to produce a tapered effect along the length of the element.

- (1) Note. Examples of subject matter found here are helical resistors with certain of the element turns or portions of the turns short-circuited to produce a tapered effect, or resistance elements having conducting strips extending along their lengths.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

92+, for a resistor having a short circuiting means, which is adjustable to vary the resistance value.

- 140** This subclass is indented under subclass 138. Subject matter wherein a plurality of electrically separate conducting structures are each connected to the tapered resistance element along its length together with a terminal movable along or over the conducting structures to constitute a contact on such structure.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

72, for a mechanically tap type variable resistor in or on a lamp socket.  
154, for a variable resistor having an intermediate conductive strip between the resistance element and the movable member, usually to reduce wear.  
185+, for variable resistors of the tap type.  
323, for a fixed resistor having a terminal tapped along the resistance element.  
325, for a resistor with three or more terminals.

- 141** This subclass is indented under subclass 138. Subject matter wherein the tapered element is formed as two or more continuous closed coils or loops as a spiral, helix, or toroidal winding.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

218, for resistors with helical or wound tapered resistance elements.  
263+, for resistors having a helical wound element with a casing or housing coated on.  
267+, for incased, embedded or housed helical or wound resistors generally.  
296+, for helical or wound resistors generally.

- 142** This subclass is indented under subclass 138. Subject matter wherein the tapered resistance element is coated on a base.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

292, for a resistor with a fixed zigzag or sinuous resistance element formed as a coating.  
300, for a resistor with a fixed helical resistance element formed as a coating.  
308+, for a resistor whose element is coated on a base.

SEE OR SEARCH CLASS:

427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.  
428, Stock Material or Miscellaneous Articles, subclasses 156+ for a plural layer stock material in which one

layer comprises a layer which varies in thickness, and which may involve resistance materials.

- 143** This subclass is indented under subclass 118. Subject matter wherein the resistance element is formed as a helix, the contact being mounted to move around and remain in contact with each convolution of the helix.

- (1) Note. In this type of resistor the contact must be rotated relative to the helix through substantially more than 360° to move the contact from one end to the other of the helical element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 79, for mechanically variable resistors with element winding and/or unwinding.  
162+, for variable resistors with contacts that are angularly slidable over the resistance element.  
190+, for variable resistors of the tap type which have an angularly movable contact.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclasses 139+ for inductors having a contactor following a helical conductor.

- 144** This subclass is indented under subclass 143. Subject matter wherein the helical resistance element is wound on a core or reel and is adapted to have the portion adjacent the contact raised slightly from the surface of the core, as by having the contact disposed between adjacent portions of the core and the element, the portion of the element which is raised changing with changes in the position of the contact to remain adjacent the contact.

- 145** This subclass is indented under subclass 143. Subject matter wherein the helical resistance element is mounted for linear or rotational movement with respect to the structure mounting the contact, so that the position of the contact along the helix may be changed, or the helix may be moved to provide for an adjustment of the contact along the length of the helix.

- (1) Note. Included here are helices which rotate to permit an adjustment of an angularly fixed contact along their length, or helices which are moved linearly to permit adjustment of a linearly fixed contact along their length.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 43, 44 and 46, for resistors responsive to change of inclination in which the resistance element may move.  
79, for mechanically variable resistors with element winding and/or unwinding.  
80+, for variable resistors of the liquid element type, especially subclass 86.  
150+, for resistors whose element moves with respect to a fixed contact.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclasses 115+ for relatively movable inductor coils, especially subclasses 117+.

- 146** This subclass is indented under subclass 143. Subject matter wherein a helical collector or return is positioned concentric with the helical resistor element but spaced therefrom so that the contactor bridges across or between the resistor element and collector ring to establish an electrical circuit therethrough.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 125+, for a resistor having a contact bridged across plural resistance elements.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclass 138 for inductors having plural conductors, which may be helical, bridged by a conducting member.

- 147** This subclass is indented under subclass 143. Subject matter wherein a relatively long resistance element is arranged in a flat spiral configuration, the contactor track or path being in a plane parallel with the spiral element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 207, for a fixed resistor in which the element and base are rolled together.
- 297, for a helical or wound resistance element formed as a flat spiral.

**148** This subclass is indented under subclass 143. Subject matter wherein a threaded shaft or screw having a contactor linked therewith is so located in relation to the helical resistor element that rotation of the threaded shaft causes linear travel of the contact as the contact is rotated along the turns of the helical wound resistance element.

- (1) Note. The helical screw is structure separate from and in addition to the helical resistance element, although the screw may be a track parallel to the helical element. Where the contactor is moved linearly by engagement with the helical turns of the resistance element, classification is in the generic subclass 143 above.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 180+, for a mechanically variable resistor having a screw operated rectilinearly slidable contact.
- 202, for movable contact structure, per se.

**149** This subclass is indented under subclass 143. Subject matter wherein significant stopping means is provided to positively limit or apply a positive stop to the movement of the contactor over the helical resistance element before reaching an end of the element so that the contact will remain in engagement with the element.

- (1) Note. Subject matter generally found in this subclass consists of a nut, or projection located on the operating mechanism or housing of the resistance element, so that the contact upon reaching a predetermined point or points, such as the ends of the helical element, is prevented from any further movement.

**150** This subclass is indented under subclass 118. Subject matter wherein the resistance element is movably mounted in a frame, housing, or other structure supporting the element and contact to permit the adjustment of the contact over the length of the resistance element.

- (1) Note. Included here are resistors whose contact is fixed and whose resistance element is rotated or moved linearly to effect adjustment of the contact over the length of the element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 43+, for resistors responsive to change of inclination in which the resistance element may move.
- 79, for variable resistors with element winding and/or unwinding.
- 80+, for variable resistors of the liquid element type, especially subclass 86.
- 92+, for resistors having an element section short circuiting means.

SEE OR SEARCH CLASS:

- 333, Wave Transmission Lines and Networks, subclass 81 for attenuators which may have movable resistance structure.
- 336, Inductor Devices, subclasses 115+ for relatively movable inductor coils.

**151** This subclass is indented under subclass 150. Subject matter wherein the contact is a liquid disposed in structure such as a tank or trough for restraining its flow; the resistance element having a portion in the liquid or engaging the surface of the liquid, the portion being changed with movement of the element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 44, for resistors responsive to change in inclination, and which have a liquid contact.
- 94, for resistors whose element is adjustably short-circuited, and including a liquid contact.
- 156, for resistors having a liquid contact.



- 152** This subclass is indented under subclass 150. Subject matter including a knob, the resistance element being disposed within the knob or directly on the surface of the knob, and being rotatable with the knob to move along the contact.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 163, for a resistor having an angularly slidable contact in which the knob forms the casing or covering.  
184, for a resistor whose contact slides along the resistance element with a housing.  
199, for mechanically variable resistors with housings.

- 153** This subclass is indented under subclass 118. Subject matter including structure mechanically linked with the movable contact of the resistor or the element where movable, and peculiarly adapted for operation by the foot or knee, as by being operable by a push, and including structure such as a spring for returning to the initial position upon removal of the pushing force, and including a portion shaped to facilitate engagement with the foot as by being shaped like the sole of the foot or having a substantially flat foot engaging surface.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 47, for resistors whose value is responsive to a force as there defined.  
108, for variable compressible resistors operated by a pedal or treadle.  
215, for a fixed resistor and switch combination which may be operated by a pedal or treadle.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 512+ for foot operated linkage systems; subclass 515 for knee operated linkage systems; and subclasses 560+ for pedal type levers.

- 154** This subclass is indented under subclass 118. Subject matter wherein a flexible conductive strip is disposed over the contact or tap path of the resistance element and normally spaced from the element or taps, the movable contact

bending the portion of the strip overlying the contact into electrical engagement with the resistance element or taps; the portion of the strip engaging the resistance element or taps depending on the position of the contact.

- (1) Note. The purpose of this conductive strip is usually to reduce the wear on the resistance element or taps due to movement of the contact over the element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 92+, for variable resistors having adjustable short circuiting means, especially subclass 93.

- 155** This subclass is indented under subclass 118. Subject matter wherein the contact rocks over or along the resistance element, or the intervening structure between the element and contact such as the element taps.

- (1) Note. For classification here the contact must rotate over in the element or taps in a small arc, in any event less than 360°. Usually the contacting surface of the contact has a length comparable to the length of the element or tap path, and the contacting surface does not extend completely around the contactor. Where the contact rotates at least one revolution in passing over the length of the element or tap path classifications is in subclasses 157+ below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 96, for a mechanically variable resistor with an element short circuiting spring which may be progressively pressed over the element.  
157+, for a mechanically variable resistor with a contact which rolls over the element or tap path. See also (1) Note above.

- 156** This subclass is indented under subclass 118. Subject matter wherein the contact or the portion of the contact which directly engages the resistor element and through which the electrical connection is made is a conducting liquid.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 27, for a resistor whose resistance value is responsive to ambient temperature and having a liquid contact.
- 34+, for a resistor responsive to liquid or moisture in which the liquid may be the contact.
- 38, for a fluid or gas pressure actuated resistor with a liquid contact.
- 80+, for a mechanically variable resistor whose resistance element is a liquid.
- 94, for a resistor whose element is adjustably short-circuited, and including a liquid contact.
- 151, for a variable resistor wherein the resistance element moves along a liquid contact held stationary as by gravity.

## SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 152 for circuit breakers having a contact of conducting liquid.
- 323, Electricity: Power Supply or Regulation Systems, subclass 296, for impedance systems having a resistor with a liquid contact.

**157** This subclass is indented under subclass 118. Subject matter wherein the movable contact has a rolling surface which rolls along, or over, and in direct contact with the resistance element or with the intervening structure between the element and contact, such as the element taps.

- (1) Note. Subject matter generally found in this subclass includes a contact having a rolling or revolving surface that rolls along or over and remains in direct contact with the resistance element or taps as opposed to the type of contact which slides or rubs along or over the resistance element as classified in subclasses 160+ below. As between this subclass (157) and subclass 155 above, the contact must make at least a complete revolution in its adjustment over the length of the element for classification in this subclass (157). See also (1) Note under subclass 155.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 79+, for reel type resistors which may include a rolling contact.
- 143+, for mechanically variable resistors involving a contact which rolls along a helical resistance element.
- 155, for mechanically variable resistors whose contact rocks along the element. See also (1) Note, above.
- 202, for movable contact structure such as contacts, per se.

## SEE OR SEARCH CLASS:

- 191, Electricity: Transmission to Vehicles, especially subclass 53, 56 and 63+, for trolley collectors involving rolling contractors.

**158** This subclass is indented under subclass 157. Subject matter wherein the rolling contact terminal rolls in a straight path over or along the resistance element or taps.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 74, for a mechanically variable resistor having a rectilinearly slidable contact, the resistor being mounted in or on a lamp socket.
- 117, for a variable resistor having slidable helical and linear contacts.
- 133, for a ganged rectilinearly operated variable resistor.
- 176+, for variable resistors whose contact slides rectilinearly over the element.
- 194, for a variable resistor having taps contacted by a rectilinearly movable contact.

**159** This subclass is indented under subclass 118. Subject matter wherein a mass of heat conducting material usually metallic is disposed in the vicinity of the resistance element to provide a medium for transmission of the heat from the element along a desired and limited path.

- (1) Note. The subject matter classified here provides a distinct and limited path for the heat passage for cooling purposes as opposed to a heat conductive casing which dissipates the heat in all directions from the element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 25+, for resistors whose resistance value changes with ambient temperature.
- 51+, for resistors with heat dissipating projections, e.g., vanes.
- 226+, for resistors generally with a heat conductive casing or housing. See also (1) Note, above.

**160** This subclass is indented under subclass 118. Subject matter wherein the movable contact terminal slides or rubs along and remains in direct contact with the resistor element while sliding or rubbing along to enable a portion of the length of the element to be placed in the electrical circuit.

- (1) Note. The contact may be removed from the element as by being moved off an end of the element, or raised from the element, as for switching purposes as provided in indented subclass 173.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 86, for variable liquid resistors wherein the level of the liquid is adjustable.
- 117, for a variable resistor having slidable helical and linear contacts.
- 137+, for a variable resistor having plural moving contacts.
- 138+, for variable resistors having tapered elements.
- 143+, for a variable resistor whose contactor moves along a helical resistance element.
- 150+, for variable resistors whose element moves in relation to a fixed contact.
- 154, for a resistor with an intermediate contactor between the resistance element and the contact member.
- 185+, for a variable resistor having intervening connectors between the contact and element, e.g., taps.

SEE OR SEARCH CLASS:

- 336, Inductor Devices, subclasses 137+ for inductors with means for varying the effective coil length.

**161** This subclass is indented under subclass 160. Subject matter wherein the resistance element is substantially entirely encased or enclosed by a casing or covering with no intervening space therebetween (i.e., the inner surface of the casing or covering is in contact with the outer surface of the resistance element), except for an open space in the casing directly over the portion of the resistance element where the contact slides.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 192+, for variable tap type resistors with angularly movable contacts, whose resistance element is enclosed.
- 226+, for incased, embedded or housed fixed resistors.
- 331, for resistors whose element is mounted in a groove in the base.

**162** This subclass is indented under subclass 160. Subject matter wherein the movable contact structure pivots about an axis for the resistance element contacting portion to slide in a circular path along the resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 73, for lamp socket type adjustable resistors including an angularly slidable contact.
- 117, for mechanically adjustable resistors including slidable helical and linear contacts.
- 143+, for mechanically adjustable resistors wherein the contact slides on a helical resistance element.
- 190+, for mechanically variable resistors whose contact is angularly movable over a plurality of taps.

**163** This subclass is indented under subclass 162. Subject matter including a housing for the resistance element and contact structure, the housing or a portion thereof being linked with the movable contact structure and providing a knob actuating means for this structure.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 152, for mechanically variable resistors including a knob enclosing a movable resistance element.  
 164, 184 and 199, for mechanically variable resistors with housings.
- 164** This subclass is indented under subclass 162. Subject matter including a casing with the necessary seals to prevent passage of air, dust, or moisture to the resistor structure contained therein.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 184, and 199, for variable resistors with housings not necessarily hermetically sealed.  
 226+, for incased, embedded or housed fixed resistors.
- 165** This subclass is indented under subclass 162. Subject matter wherein the resistance element is straight and elongated, as a straight rod or cylindrical helix.
- (1) Note. In this subclass the element is not curved to correspond to the arcuate swing of the contact, as is usual under subclass 162.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 102, for pile type compressible resistors with a contactor movable along the pile.
- 166** This subclass is indented under subclass 162. Subject matter wherein the contact actuating means or a portion thereof is readily separable from the resistor, such as a key or readily removable knob or shaft, as to prevent unauthorized adjustment of the resistor; or wherein structure is provided to permit ready adjustment by some actuator not ordinarily considered a part of the resistor such as a slot for the blade of a screw driver.
- SEE OR SEARCH CLASS:  
 200, Electricity: Circuit Makers and Breakers, subclasses 42+ for switches having means for preventing unauthorized use.
- 167** This subclass is indented under subclass 162. Subject matter wherein a spring or similar structure is connected between the rotatable and the fixed structure of the resistor to bias the contact to a fixed predetermined point in its arc of movement, while permitting adjustment from this point against its biasing effect.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 99+, for especially subclass 105, for compressible resistors involving a biasing effect and subclass 108, for compressible resistors which are pedal or treadle operated.  
 116+, for resistors adjustable by an electric motor.  
 153, for pedal or treadle operated variable resistors of the movable contact type having a contact biased along the resistance element.  
 168, for an adjustable resistor having an angularly slidable contact, and a spring between the fixed and movable parts for conducting electric energy to the contact.
- 168** This subclass is indented under subclass 162. Subject matter wherein a flexible or resilient conductor is provided between the movable contact and a terminal fixed on stationary resistor structure, the ends of the conductor being secured to the movable and stationary structure, respectively.
- (1) Note. The flexible conductor may be a spring, whose respective ends are secured to the terminal and contact.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
 167, for variable resistors with angularly slidable spring loaded contacts.
- 169** This subclass is indented under subclass 162. Subject matter wherein structure is provided which permits a selective variation in the pres-

sure exerted by the contact on the resistance element.

**SEE OR SEARCH CLASS:**

200, Electricity: Circuit Makers and Breakers, subclass 170 for means of maintaining or adjusting pressure between the contacts of a switch.

- 170** This subclass is indented under subclass 162. Subject matter including a spring mounted on and in addition to the contact carrier, guide, or arm, and biasing the contact against the resistance element.

(1) Note. A mere resilient contact arm which performs the dual function of supporting the contact portion, and also biasing it against the resistance element is not sufficient for classification here, but elsewhere under subclass 162. For classification here the biasing spring must be structure in addition to the contact arm or carrier.

- 171** This subclass is indented under subclass 162. Subject matter wherein the contact is composed of two or more separated portions, each portion engaging the resistance element, all portions being slidable as a unit along the resistance element.

(1) Note. Usually the purpose of the plural contact portions is to maintain a more uniform electrical conduction path between the contact arm and the resistance element as the contact slides along the element, as to reduce circuit noise.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

16, for photoconductive resistors with vibration control.  
98, for mechanically variable resistors with motion or vibration damping means.  
202, for movable contacts structure generally.

- 172** This subclass is indented under subclass 162. Subject matter wherein the mechanically variable resistor with a contact angularly slidable on a resistance element is combined with a sep-

arate switch or includes switching structure as an inherent part of the resistor.

(1) Note. The switch and resistor may control the same or a different electric circuit. The resistor and switch are usually actuated by motion of the same shaft.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

179, for variable resistors having a rectilinearly slidable contact together with a series switch.  
191, for variable resistors of the tap type with angularly movable contacts together with a switch.  
198, for variable resistors generally together with a switch actuated by the resistor actuator.  
200+, for variable resistors generally combined with a switch.

**SEE OR SEARCH CLASS:**

200, Electricity: Circuit Makers and Breakers, appropriate subclasses, for electric switches, per se.

- 173** This subclass is indented under subclass 172. Subject matter wherein the contact slidable on the resistance element is separable from the element by being rotated beyond the end of the element or by being lifted from the element (usually by rotational or axial movement of the shaft) to break the electric circuit through the resistance.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

185+, for variable tap type resistors in which the movable contact may be disconnected from the taps of the resistor element during operation of the resistor.  
198, for variable resistors generally with a switch actuated by the resistor actuator.

- 174** This subclass is indented under subclass 162. Subject matter wherein a conducting ring or arcuate portion of a ring is provided which is electrically connected to or constitutes one terminal of the resistor, the contact or its arm or conducting structure movable with the contact

slidably engaging the ring to convey the electrical energy from the terminal to the contact.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 146, for a helical resistor with a following contact and a helical collector bar parallel to the helical resistance element.
- 188, for mechanically adjustable resistors having an intervening connector such as a tap between the contact and element and including a collector bar or ring.

**175** This subclass is indented under subclass 174. Subject matter wherein the ring constitutes a bearing which directly engages the shaft, the shaft being of conductive material.

- (1) Note. The ring may be a cylindrical bearing surrounding the shaft and engaging the cylindrical surface of the shaft, or may be a thrust bearing engaging a groove or flange on the shaft to prevent axial movement of the shaft. The ring for classification here must directly engage the conducting shaft, and not merely connect with some other structure movable with the shaft.

**176** This subclass is indented under subclass 160. Subject matter wherein the movable contact terminal moves in a straight path over or along a resistance element, the contact terminal remaining in contact with the element as it slides along.

- (1) Note. Subject matter found in this subclass usually consists of a resistor element having an elongated shape with at least two terminals connected to the element, at least one of the terminals being rectilinearly slidable along or over, and in direct contact with the resistance element so that the effective resistance of the circuit may be changed by sliding the terminal with respect to the resistance element.
- (2) Note. The contact terminal may be removed from the element at any point in the sliding path or at an end for switching purposes. See subclass 178 below for such subject matter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 74, for a variable resistor having a rectilinearly slidable contact, and mounted in or on a lamp socket.
- 117, for a variable resistor having slidable helical and linear contacts.
- 133, for ganged rectilinearly operated variable resistors.
- 194, for a variable resistor having taps and a rectilinearly movable contact.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 4 and 16 for multiple circuit control switches with reciprocating contacts; and subclasses 76+ for snap switches having reciprocating contacts.

**177** This subclass is indented under subclass 176. Subject matter wherein the rectilinearly slidable contact completely surrounds or embraces the resistance element, and contacting the element around the entire periphery of the element.

- (1) Note. Subject matter generally found in this subclass consists of an elongated resistance element having a rectilinearly movable conducting band or ring completely encircling the element to form a contact having ringed engagement entirely around the resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 92+, for variable resistors having a short circuiting means which may include a conducting contact completely surrounding the resistance element.
- 272, for incased resistors whose terminals or leads surrounds and are secured to the casing or housing.
- 313, for resistors with elements extending along a base, the terminals surrounding the base.
- 332, for resistors with terminals embracing or surrounding a resistance element.

**178** This subclass is indented under subclass 176. Subject matter wherein the rectilinearly slidable contact is adapted to separate from the resistance element for switching.

- (1) Note. Subject matter generally found in this subclass includes a resistance element engaged by a rectilinearly movable contact with the contact being adapted to separate or leave the resistance element to open the electrical circuit formed therethrough as by lifting from or sliding out of engagement with the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 74, for a resistor having a rectilinearly slidable contact in or on a lamp socket and which may include switching.  
 172+, for a variable resistor having an angularly slidable contact together with switching.  
 179, for a variable resistor having a rectilinearly movable contact together with a series switch.  
 191, for a tap type resistor having angularly movable contact together with a switch.  
 200+, for variable resistors generally with switches.  
 215, for a fixed resistor combined with a switch.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclasses 76+ for switches operated by a reciprocating contact.

**179** This subclass is indented under subclass 176. Subject matter wherein the resistor is combined with a switch in series with the resistor.

- (1) Note. Subject matter in this subclass includes a rectilinearly movable contact which may carry an operating means which opens or closes an electrical circuit through the resistance element upon movement of the contact.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 172+, for a variable resistor having an angularly slidable contact together with a switch.  
 178, for a variable resistor having a rectilinearly slidable contact separable from the resistance element for switching.  
 191, for a tap type resistor having an angularly movable contact together with a switch.  
 200+, for variable resistors generally with switches.  
 215, for a fixed resistor combined with a switch.

SEE OR SEARCH CLASS:

- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 2+ for electromagnetically activated switches.

**180** This subclass is indented under subclass 176. Subject matter including a helical screw and nut as the actuator or a part of the actuator for the rectilinearly slidable contact.

- (1) Note. Subject matter in this subclass usually includes a screw threaded shaft having a slider located thereon with the slider carrying a contact brush engaging a resistance element. Upon rotation of the shaft the slider and contact brush are moved rectilinearly over the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 87+, for a variable resistor of the penetrating type which may be screw operated.  
 117, for a variable resistor with slidable helical and linear contacts which may be screw operated.  
 125, for resistors with plural elements bridged by a movable contact which may be screw operated.  
 148, for a resistor whose contact follows the helical turns of the resistance element with the contact being screw operated.

**181** This subclass is indented under subclass 180. Subject matter including structure which permits sliding the contact along the resistance element by direct application of linear force on the contact for a coarse adjustment of the contact, the screw providing a fine or vernier adjustment.

- (1) Note. Usually here the screw and nut threads are readily separable, or the threads have a large pitch to permit direct adjustment.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

122+, for mechanically variable resistors with coarse and fine resistance elements.

**182** This subclass is indented under subclass 176. Subject matter including means for securing the contact at some definite point on the resistance element to prevent motion of the contact in both directions along the element.

- (1) Note. A mere stop which prevents motion of the contact in one direction is not classified here, but in the generic subclass 176 above. Subject matter generally found in this subclass includes a rectilinearly movable contact having some means, usually a nut or screw, to secure the contact to some point on the resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

131, for ganged plural variable resistors, the resistors being individually adjustable.  
135, for variable resistors with zero setting or phasing means.  
136, for a resistor with a contact clamped on the resistance element.

**183** This subclass is indented under subclass 176. Subject matter including a conducting bar extending parallel to the resistance element and constituting one terminal of the resistor, the rectilinearly slidable contact electrically bridging and sliding along both the resistance element and the conducting bar.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

174+, for a mechanically variable resistor with an angularly slidable contact and a collector ring.  
188, for a mechanically variable resistor of the tap type having a collector bar or ring.

**184** This subclass is indented under subclass 118. Subject matter including a casing or housing which substantially encloses the resistance element and movable contact elements, leaving only the necessary operating means by which the contact element is moved exposed or extending outside of the housing to permit external adjustment of the resistor.

- (1) Note. Subject matter generally found in this subclass consists of a variable resistor of the type defined in subclass 118 above having the resistance and movable contact element both completely enclosed within a box like casing or housing, with only some operating means such as a shaft or lever extending externally through an opening or slit to permit external adjustment of the resistance value without removal of the casing or housing.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

19, for photoconductive resistors with a transparent housing.  
70+, for mechanically variable resistors housed in or on a lamp socket.  
77, for plug box type resistors.  
80+, for liquid element resistors.  
192+, for tap type resistors whose resistance element is incased.  
199, for variable resistors generally having a housing or casing.  
226+, for incased, embedded, or housed resistors generally. See also the Search Notes under this subclass for a more extensive field of search for incased or housed resistors.

**185** This subclass is indented under subclass 118. Subject matter wherein a plurality of otherwise electrically separate conducting structures are each electrically connected to the elongated



element along its length, and a terminal being movable among the conducting structures to constitute a contact on such structures.

- (1) Note. The most common subject matter in this subclass is a resistor whose element is tapped together with a contact movable along the taps, i.e., a tap changing resistor. The path of motion of the terminal need not be fixed for classification here.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 72, for a tap type mechanically variable resistor in or on a lamp socket.  
 126, for a variable resistor with a plurality of tapped elements and a movable contact bridge.  
 140, for a variable tapered resistor of the tap type.  
 154, for a variable resistor having an intermediate conductive strip between the resistor element and the movable member usually to reduce wear.  
 323, for a resistor having terminals tapped along the resistance element.  
 325, for a resistor with three or more terminals.

**SEE OR SEARCH CLASS:**

- 200, Electricity: Circuit Makers and Breakers, especially subclass 4, 6+ and 16, for multiple circuit control switches with movable contacts which may engage taps.  
 323, Electricity: Power Supply or Regulation Systems, subclasses 255+, for tap changing regulation systems.  
 336, Inductor Devices, subclass 150 for adjustable tap changing inductors.

- 186** This subclass is indented under subclass 185. Subject matter wherein the connector is formed as a plurality of helical turns which are severed along the length of the helix to provide a plurality of physically and electrically separate taps or contacts, each severed turn engaging the resistance element, as by surrounding or being embedded therein, or wherein the connector is formed as a plurality of comb teeth, the base of the comb being removed to leave the severed teeth physically and electrically separate to provide taps or contacts, the teeth

engaging the resistance element, as by being embedded therein.

**SEE OR SEARCH CLASS:**

- 29, Metal Working, subclass 621 for methods of applying terminals to resistors involving metal working or assembly and not otherwise classifiable.

- 187** This subclass is indented under subclass 185. Subject matter including structure or arrangement to reduce or eliminate arcing between the movable contactor and the conducting structures, such as taps engaged by this contactor as the contact moves off a conducting structure or from one conducting structure to the next.

**SEE OR SEARCH CLASS:**

- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for electrical switches involving arc preventing and extinguishing.  
 361, Electricity: Electrical Systems and Devices, subclasses 2+ electrical safety and protection systems for contact-arc suppression.

- 188** This subclass is indented under subclass 185. Subject matter together with a conducting bar or ring, along which the movable contact slides or along which a contact movable with and electrically connected to the first movable contact slides.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 146, for a helical resistor with a following contact and a helical collector bar parallel to the helical resistance element.  
 174, for a resistor whose contact slides along and remains in contact with the resistance element together with a collector bar or ring.

- 189** This subclass is indented under subclass 185. Subject matter including a retaining or positioning magnet for locking or holding the movable contact in a predetermined position.

- (1) Note. Subject matter classified in this subclass usually consists of a series of resistance-coils or other resistances

adapted to be gradually cut into circuit by movement of a spring biased contact lever or arm from one tap to another in a predetermined order. When the final position is reached, the electromagnet holds the lever or arm in position against the stress of the biasing spring, which has a tendency to move the contact to its original or starting position. When the electrical circuit is broken in the magnet, the contact is returned to its starting position by the stress of the biasing spring.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 12, for resistors magnetically operated through a housing or partition.
- 32, for resistors whose resistance value is responsive to a magnetic field.
- 64+, for resistors having electrical shielding.
- 103+, for compressible resistors of the pile type operated by an electromagnet.
- 107, for compressible resistors of the pile type which have an electromagnetic holder for the operator.
- 116, for mechanically variable resistors generally with electromagnetic operators.
- 182, for resistors with rectilinearly movable contacts and a contact locking means.

**SEE OR SEARCH CLASS:**

- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 2+ for electromagnetically activated switches.

**190** This subclass is indented under subclass 185. Subject matter wherein the contact moves angularly over the conducting structures connected to the resistance element i.e., the contact moves about a pivot point.

- (1) Note. To be properly classified in this subclass the tapped resistance element need not have an angular shape nor do the taps need to be in an arcuate or circular configuration. The contact however must move about a pivot point in such a manner as to strike an arc of a circle when moved across the taps.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 162+, for resistors having an angularly slidable contactor which slides along and remains in contact with the resistor element.
- 194, for a variable tap type resistor having a slidable contactor which moves in a straight line.

**SEE OR SEARCH CLASS:**

- 200, Electricity: Circuit Makers and Breakers, subclass 4 and 6, for multiple circuit control switches with pivoted contacts.

**191** This subclass is indented under subclass 190. Subject matter wherein an electric switch is included in the electrical circuit to allow the electrical resistor to be cut into or out of electrical circuit.

- (1) Note. The switch may or may not be operated by the angularly movable contact.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 172+, for a variable resistor having an angularly slidable contact together with a switch.
- 178, for a variable resistor having a rectilinearly slidable contact separable from the resistance element for switching.
- 179, for a variable resistor having a rectilinearly slidable contact and a series switch.
- 198, for a variable resistor and a switch actuated by the resistor actuator.
- 215, for a single fixed resistor and switch combined.

**SEE OR SEARCH CLASS:**

- 307, Electrical Transmission or Interconnection Systems, subclasses 112+ for miscellaneous switching systems.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 2+ for electromagnetically activated switches.

**192** This subclass is indented under subclass 190. Subject matter wherein the resistance element is enclosed or housed as defined in subclass 226 below.

- (1) Note. Usually in this subclass the taps from the resistance element and the movable contact structure are located outside of the housing or enclosure surrounding the resistor element. For substantially completely housed tap type resistors whose contact arms are also enclosed or housed see subclass 184 above and 199 below.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 64+, for resistors with electrical shielding.  
 70+, for mechanically variable resistors housed in a lamp socket.  
 80+, for mechanically variable liquid resistors.  
 161, for an incased variable resistance element with the casing partly removed to form a track for a movable contact.  
 184, for variable movable contact type resistors having a housing.  
 199, for variable resistors generally with a housing.  
 219, for fixed resistors housed in a lamp socket or base.  
 226+, for fixed resistors which are incased, embedded, or housed.

**193** This subclass is indented under subclass 192. Subject matter wherein the enclosure surrounding the resistor element is formed on and hardened on the element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 275, for a fixed resistor having a casing or housing formed on and hardened on the resistance element.

**194** This subclass is indented under subclass 185. Subject matter wherein the contact moves in a straight line over the conducting structures connected to the resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 74, for a mechanically variable resistor having a rectilinearly slidable contact in or on a lamp socket.  
 133, for ganged plural resistors operated rectilinearly.  
 176+, for mechanically adjustable resistors including a contact rectilinearly slidable on a resistance element.  
 190+, for resistor with an intervening connector between the contact and element, the contact being angularly movable.

SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, subclass 4 and 16, for multiple circuit control switches with a reciprocating contact; and subclasses 76+ for snap switches having a reciprocating contact.

**195** This subclass is indented under subclass 68. Subject matter wherein a finished or completely manufactured resistor includes structure for removing or adding resistance material to or from the resistance element to change the resistance value of the resistor; or wherein the resistance element is peculiarly adapted for such removal on addition of material; or wherein the resistance element includes resistance or conducting material which may be removed or slit to alter the resistance value of the element.

- (1) Note. The subject matter in this subclass includes finished or completed resistors, as opposed to those resistors to which material is added or subtracted in or as part of the manufacturing of the resistor.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 75, for a variable resistor with a cleaner.  
 203, for resistors readily severable into independent resistors.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 610.1+ for methods of making electrical resistors involving metal working.

- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.
- 428, Stock Material or Miscellaneous Articles, subclasses 195+ for a plural layer stock material product in which one layer comprises a discontinuous or differential coating, impregnation or bond and the product may involve resistance materials.
- 451, Abrading, subclasses 28+ for an abrading process in general.
- 196** This subclass is indented under subclass 68. Subject matter including structure such as a pointer, gauge, or scale for showing the displacement of the resistor actuator or the mechanical adjustment of the resistor with respect to some fixed object, and thus furnish an indication of the resistance value for which the resistor is set.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 13+, for variable resistors responsive to a condition, and including indicating structure, when not otherwise classifiable.
- 119, for a resistor whose contact moves along the resistance element together with a light to indicate the displacement of the contact or the setting of a switch associated with the resistor.
- SEE OR SEARCH CLASS:
- 116, Signals and Indicators, subclasses 124+ for miscellaneous position indicators other than the electrically actuated or controlled type.
- 200, Electricity: Circuit Makers and Breakers, subclass 56 for a pointer and circuit-breaker having a common operator.
- 336, Inductor Devices, subclass 45 for inductor devices with a movable element position indicator.
- 340, Communications: Electrical, appropriate subclasses, for electrically actuated or controlled signals and indicators.
- 197** This subclass is indented under subclass 68. Subject matter including a variable resistor as defined in subclass 68 together with structure that establishes and/or maintains the resistor position or path of movement with reference to some other object.
- (1) Note. The subject matter of this subclass usually involves a variable resistor mounted on a panel. For classification purposes the panel or the structure securing the variable resistor to the panel or other object may be considered a support.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 2+, for strain gauge type resistors adapted to be supported on the test specimen.
- 50, for resistors mounted on wheels or vehicles.
- 70+, for mechanically variable resistors mounted in or on a lamp socket.
- 315+, for fixed resistors with supports. See also the Search Notes under this subclass for a more extensive field of search for resistors and supports.
- SEE OR SEARCH CLASS:
- 384, Bearings, subclasses 428+ for resistor bearing supports.
- 198** This subclass is indented under subclass 68. Subject matter wherein a variable resistor as there defined is combined with a switch, there being a linkage between the resistor and switch so that variation of the variable resistor over some portion of its resistance range causes operation of the switch to make and/or break an electrical circuit, or so that operation of the switch to make and/or break an electric circuit causes variation of the variable resistor over some portion of its resistance range.
- (1) Note. Usually the subject matter of this subclass includes a variable resistor of no particular type together with a switch, the resistor operating the switch or vice versa.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 78, for a mechanically variable resistor combined with a current reversing switch.
- 110, for a compressible type resistor together with a switch actuated by the resistor actuator.
- 129, for plural mechanically variable resistors sequentially operated.
- 130+, for ganged mechanically variable resistors.
- 172+, for a mechanically variable resistor with an angularly slidable contact together with a switch.
- 179, for a mechanically variable resistor with a linearly slidable contact together with a series switch.
- 191, for a mechanically variable resistor with an intervening connector between the contact and element together with a switch.
- 200+, for a variable resistor including a switch to change the resistance value of the variable resistor.
- 215, for fixed resistors combined with switches.

## SEE OR SEARCH CLASS:

- 307, Electrical Transmission or Interconnection Systems, subclasses 112+ for miscellaneous switching systems.
- 335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 2+ for electromagnetically activated switches.

- 199** This subclass is indented under subclass 68. Subject matter including a housing or casing which substantially entirely encloses the mechanically adjustable or variable resistor, with only the necessary resistor operating mechanism extending outside the casing to permit external adjustment of the resistor.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 19, for photoconductive resistors with transparent housings.
- 70+, for a variable resistor housed in a lamp socket.
- 77, for plug box type resistors.
- 80+, for liquid element resistors.

- 163, for mechanically adjustable resistors with an angularly slidable contact and a knob forming a casing or covering; and subclass 164 for such resistors with hermetically sealed housings.
- 184, for resistors with a movable contact electrically adjustable over the length of the element, the resistors being housed.
- 192+, for a tap type resistor whose element is enclosed.
- 226+, for incased, embedded, or housed resistors generally. See also the Search Notes under this subclass for a more extensive field of search for such resistors.

- 200** This subclass is indented under subclass 68. Subject matter including one or more resistance elements together with one or more switches, which connect the elements in at least two circuit configurations to present two different resistance values across a set of terminals.

- (1) Note. This subclass is residual for resistors whose elements are usually of fixed resistance value, which may be switched to present different resistance values across the terminals. Resistors with a tapped element and a contact movable along the taps for varying the resistance across the resistor terminals are classified in subclasses 185+ above. Subclass 215 provides for the combination of a resistor of fixed resistance value together with a switch in series or parallel with the resistance element. In subclass 215 only one ohmic resistance value together with an open or short circuit appears across the terminals regardless of the switching positions. Where two resistance values appear across the terminals due to switching, classification is in this subclass (200) as a residual place.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 78, for a mechanically variable resistor combined with a current reversing switch.
- 172+, for a variable resistor having an angularly slidable contact, and including a switching means.

- 178, for a variable resistor having a rectilinearly slidable contact separable from the element for switching.
- 179, for a variable resistor having a rectilinearly slidable contact together with a series switch.
- 185+, for tap type variable resistors. 191, for a tap type variable resistor with an angularly movable contact and combined with a switch.
- 198, for a mechanically variable resistor and switch actuated by the resistor actuator.
- 215, for a combined single fixed resistor and switch.

## SEE OR SEARCH CLASS:

- 200, Electricity: Circuit Makers and Breakers, appropriate subclasses, for switches, per se.
- 307, Electrical Transmission or Interconnection Systems, subclasses 112+ for miscellaneous switching systems.
- 323, Electricity: Power Supply or Regulation Systems, subclasses 209+ for systems of a voltage source and a load with a resistance network therebetween whose resistive value may be changed as by switching.

**201** This subclass is indented under subclass 200. Subject matter wherein the switch or switches connects a plurality of resistance elements in or out of a parallel circuit arrangement.

**202** This subclass is indented under the class definition. Subject matter including an electrode or terminal, which may include the adjacent supporting structure such as the contact arm, the electrode or terminal being adapted to connect movably and electrically along or into a resistance element as by sliding along or into the element, the electrode or terminal as such not being otherwise classifiable.

- (1) Note. For classification here the claims must be limited to the contact and arm, the resistance element being excluded. Subclasses 68+, and especially subclasses 118+, provides for the combination of the resistance element and contact movable thereon. Contacts which operate with taps electrically connected to a resistance element are classi-

fied elsewhere (see the Search Notes below)..

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 74, for a mechanically variable resistor having a rectilinearly slidable contact and being incased in a lamp socket.
- 118+, for mechanically variable resistors including a contact movable over a resistance element. See also (1) Note above.
- 153, for a variable resistor with a movable contact operated by a pedal or treadle.
- 155, for a variable resistor with a contact that rocks along the resistance element.
- 156, for a variable resistor with a liquid contact movable over the resistance element.
- 157+, for a variable resistor with a contact that rolls along the resistance element.

## SEE OR SEARCH CLASS:

- 191, Electricity: Transmission to Vehicles, subclasses 45+ for collectors carried by a vehicle or other movable body.
- 200, Electricity: Circuit Makers and Breakers, especially subclass 166 for switch contacts.
- 310, Electrical Generator or Motor Structure, subclasses 219+ for slip rings, commutators and other current collectors for dynamo-electric devices.

**203** This subclass is indented under the class definition. Subject matter wherein a plurality of resistor units are formed or constructed as a unitary structure with a groove, notch, mark, fragile or frangible part, as well as with an overall shape to facilitate separation into a plurality of individual resistor units as by breaking.

- (1) Note. In this subclass the resistor units while in a unitary structure before severing or breaking into individual units are capable of functioning as a resistor or a plurality of resistors, and the individual units formed after the breaking step are also capable of functioning as a complete resistor.

- (2) Note. This subclass only provides for resistors units readily separable into individual resistor units. The independent resistors formed from such units are classified according to their own characteristics.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 260+, for plural incased resistors.  
 295, for plural resistors connected by a jumper or spacer.  
 319, and 320, for plural resistors with a mounting or supporting means.

**SEE OR SEARCH CLASS:**

- 29, Metal Working, subclasses 610.1+ for methods of making electrical resistors involving severing; and subclasses 412+ for processes of mechanical manufacture generally involving obtaining plural pieces from a unitary piece.

**204** This subclass is indented under the class definition. Subject matter wherein the resistance element is formed of a plurality of layers of resistance material such as discs or buttons, piled or stacked between the terminals, the layers being electrically connected in series together and in series with the terminals.

- (1) Note. Subject matter found in this subclass consists essentially of a plurality of plates or disks of resistance material piled or stacked such that the surfaces are in electrical contact or electrically connected. The plates or disks used to construct a resistor under this subclass need not be of the same resistance material.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 52, for pile type resistors with heat dissipating projections.  
 71, for a mechanically variable pile type resistor in or on a lamp socket.  
 101+, for a pile type resistor whose resistance value is varied by compression.  
 115, for mechanically variable pile type resistors in general.

- 223+, for a resistor having a granular or powdered element.  
 260+, for plural incased, embedded, or housed resistors.

**SEE OR SEARCH CLASS:**

- 361, Electricity: Electrical Systems and Devices, subclasses 117+ for high voltage dissipators, per se, wherein the discharge path may be resistive disks or buttons.  
 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a plural layer stock material which may involve resistance materials, note subclasses 411+ in which the layers are recited in terms of their compositions.  
 442, Fabric (Woven, Knitted, or Non-woven Textile or Cloth, etc.), subclasses 59+, 181+, and 304+ for a woven or knit fabric which may involve resistance materials.

**205** This subclass is indented under subclass 204. Subject matter wherein the layers of resistance material are separated by layers of relatively high conducting material.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 288, for a compound or multiple zigzag resistance element which includes conductive jumpers or spacers between elements.  
 289, for a zigzag or sinuous resistor including a conductive jumper or spacer.  
 295, for plural resistance elements connected by a jumper or spacer.

**206** This subclass is indented under the class definition. Subject matter wherein the resistance element is formed of expanded metal as defined in (1) Note below.

- (1) Note. Expanded metal type resistance elements are those formed from a metal resistance strip by cutting or otherwise forming closely spaced transverse slots in the strip so as to establish a grid or tortuous current path between terminals. The slots formed are generally as near zero in width as possible and the metal on either side of each slot is bent out of the general plane of the original sheet to

separate the sides of the slots. The separating of neighboring sides of the transverse slots may also be obtained by stretching the strip longitudinally. Generally the spacing obtained between the sides of slots is greatest at the center and tapers together at either end.

- (2) Note. This subject matter is distinguished from zigzag or sinuous resistors in that the transverse slots are closed at both ends and therefore provide more than one path for the current to flow, as opposed to the single conductance path generally provided by a zigzag or sinuous resistor.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 208, for mesh, woven, or braided resistors.  
283+, for resistors with zigzag or sinuous resistance elements. See also (2) Note above.  
322, for resistors with plural elements in parallel between terminals.  
333, for a resistor of a particular configuration and/or dimension.

**207** This subclass is indented under the class definition. Subject matter wherein the resistance element and base are folded or rolled together in final form as to form, for example, a zigzag or helical resistor.

- (1) Note. A mere insulation coated resistance element coiled or folded upon itself is not properly classified here, but in such subclasses as 262+ and 263+ below. Usually the resistors here classified are formed with the element and base in flat overlying layers, which are then folded or rolled together.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 79, for mechanically variable resistors with element winding and/or unwinding.  
210+, for resistors which are flexible or folding.  
278, for a resistor whose element is an edgewise coiled helical strip.  
279+, for a resistor with a ribbon element bent or curved on its flat side.

296+, for helical or wound resistors generally.

**208** This subclass is indented under the class definition. Subject matter wherein the resistance element includes elongated filaments, strands, or fibres of resistive material which are woven, braided, or knitted together or with other filaments, strands, or fibres of nonresistive material (conductive or insulating) to form the element as a mesh, weave, or braid.

- (1) Note. For classification in this subclass the resistive filaments, strands, or fibres must be part of the weave, mesh, or braid. A mere resistive filament, strand, or fibre secured to or interlaced through a fabric is not classified here, but in subclasses 306+ and 310 below.

- (2) Note. A mere plurality of twisted strands, filaments, or fibres are not classified here, but is in subclasses 214 and 299 below.

- (3) Note. A fabric with metal in the texture is classified in Class 139, Textiles: Weaving, subclass 425, even though the metal be resistive and/or will produce heat upon passage of an electric current therethrough.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 2, for deformable strain gauge type resistors whose element is a mesh, weave, or braid.  
114, for mechanically variable deformable resistors whose resistance value is changed by deformation.  
206, for expanded metal type resistors.  
210+, for flexible or folding resistors; and especially subclass 212, for such resistors formed as a tape or sheet, and subclass 214, for such resistors of the cable type.  
259, for resistors having a wound, braided, or woven casing or housing.  
283+, for zigzag or sinuous resistors.  
310, for a resistor whose element extends through the base. See also (2) Note above.



## SEE OR SEARCH CLASS:

- 66, Textiles: Knitting, subclasses 190+ for knitted fabrics incorporating unknitted materials.
- 139, Textiles: Weaving, subclass 425 for woven fabrics including metal. See also (3) Note above.
- 174, Electricity: Conductors and Insulators, subclasses 128.1+ for plural strand conductor structure.
- 245, Wire Fabrics and Structure, subclasses 2+ for wire fabrics.
- 343, Communications: Radio Wave Antennas, subclass 897 for mesh, woven, braided, or multiple strip antennas.

- 209** This subclass is indented under the class definition. Subject matter wherein the resistor unit is constructed to allow appreciable expansion and/or contraction between the terminals.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 114, for mechanically deformable variable resistors whose resistance value is changed by deformation.
- 206, for expanded metal type resistors.
- 208, for mesh woven or braided resistors.
- 210+, for flexible or folding resistors.
- 316, for resistors with mounting or supporting structure which compensates for or permits resistance expansion and/or contraction.

## SEE OR SEARCH CLASS:

- 139, Textiles: Weaving, subclasses 421+ for extensible or elastic woven fabrics.
- 174, Electricity: Conductors and Insulators, subclass 69 for axially extensible conduits, cables and connectors.
- 191, Electricity: Transmission to Vehicles, subclasses 12+ for flexible electrical extensions for transmitting electrical energy to vehicles.
- 219, Electric Heating, subclass 46 for flexible electric heaters.

- 210** This subclass is indented under the class definition. Subject matter wherein the resistors unit is inherently flexible or foldable, and can be

looped upon itself or collapsed into various forms without permanent deformation.

- (1) Note. For classification here the resistor unit as a whole must be flexible or folding. The flexible or folding characteristic may be present in either the element or the supporting base. A mere flexible element on a rigid supporting base, such as a flexible element wound on a rigid core, is not classified here, but in subclass 302 below in the case of the example given.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 114, for deformable variable resistors, whose resistance value is changed by deforming.
- 206, for expanded metal type resistors.
- 207, for resistors whose element and base are permanently folded or rolled.
- 208, for mesh, woven or braided resistors.
- 315+, for resistors with mounting or supporting means.

## SEE OR SEARCH CLASS:

- 139, Textiles: Weaving, subclass 425 for woven fabrics having metal woven therein.
- 174, Electricity: Conductors and Insulators, subclasses 68+ for conduits, cables and conductors, which may be flexible.
- 219, Electric Heating, subclass 549 for flexible electric heaters.

- 211** This subclass is indented under subclass 210. Subject matter wherein the resistance element is impregnated or coated on a flexible base or support.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 142, for a mechanically variable resistor whose element is formed as a tapered coating.
- 262+, for a resistor having a casing or housing formed as a coating.
- 292, for a zigzag or sinuous resistor whose element is formed as a coating.
- 307, for resistors whose element and/or terminals are printed or marked on a base.

- 308+, for a resistor whose element is coated on a base.
- SEE OR SEARCH CLASS:
- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer stock material in which one of the layers is a coating on a base or substrate, see especially subclasses 411+ for a plural layer product defined merely by the compositions of the layers.
- 212** This subclass is indented under subclass 210. Subject matter wherein the resistor unit has a substantially flat overall shape as in a tape or sheet.
- (1) Note. The element and/or base may be flattened to provide the overall flattened shape of the unit.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 26, for variable tape type resistors sensitive to changes in ambient temperature.
- 207, for a resistor whose element and base are permanently folded or rolled.
- 208, for a mesh, woven, braided resistor.
- 297, for a flattened helical or wound resistor.
- 314, for a resistor whose element and base are formed in layers.
- 213** This subclass is indented under subclass 210. Subject matter wherein an elongated flexible or folding resistance element is surrounded or incased by insulative buttons or beads, the resistance element extending through the buttons or beads.
- (1) Note. To be properly classified here the beads or buttons need not be the external layer or surface; but may be only an insulative spacer to prevent the element from curving into contact with a flexible external housing, such as a flexible metallic sheath. The faces of the beads or buttons are usually rounded or beveled to afford facility in forming or bending the unit into the required shapes.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 317, for a resistor whose element projects through a support.
- SEE OR SEARCH CLASS:
- 174, Electricity: Conductors and Insulators, subclass 111 for insulated conduits, cables and conductors with beads or discs.
- 214** This subclass is indented under subclass 210. Subject matter wherein the resistor has an elongated shape and is of substantially uniform external size over its length, the resistance element extending between the ends of the resistor.
- (1) Note. A plural conductor cable is classified here if the conductor has distinctive resistance characteristics.
- (2) Note. Subject matter found in this subclass usually consists of a resistance wire, often twisted around a core, and inclosed by insulation on the exterior, with the whole assembly forming a waterproof and insulated resistive conductor. Electric resistors having only a single element, yet having cable characteristics, are also classified in this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 26, for cables or tapes responsive to ambient temperature, e.g., fire detecting type.
- 208, for mesh, woven, or braided resistors.
- 238+, for an incased, embedded or housed resistor whose element is in powdered insulation with an outer metallic sheath.
- 243+, for an incased, embedded, or housed resistor whose element is in insulation with an outer metallic sheath.
- 260+, for plural incased resistors.

## SEE OR SEARCH CLASS:

- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 47+ for making and/or joining of electrical conductors of indefinite length.
- 174, Electricity: Conductors and Insulators, subclasses 68.1+ for conduits, cables and conductors.
- 219, Electric Heating, subclass 46 for flexible electrical heaters.

**215** This subclass is indented under the class definition. Subject matter wherein a switch is connected in series or parallel with the resistor for effectively connecting or disconnecting the resistor from the circuit; and not otherwise classifiable.

- (1) Note. As between this class and Class 200, Electricity: Circuit Makers and Breakers, the combination of a switch and a resistor which does not perfect the switching is classified here. The combination of a switch and a plurality of resistance elements or portions of an element, the switch alternately connecting and disconnecting the respective source or electrical energy, or connecting the elements or portions in different combinations of series and parallel arrangements to a source as to produce a high or low heating effect or different heat distribution patterns, is classified in Class 219, Electric Heating, especially subclasses 482+. This subclass (215) is usually limited to the structural combination of a single resistor and switch, the switch effectively connecting and disconnecting the resistor and source of electrical energy. The general combination of a plurality of resistance elements and one or more switches to produce a variable resistance value is classified in subclasses 172, 179, 185+, and 200+ above. See (1) Note under subclass 200.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 172+, for mechanically variable resistors whose contact slides angularly along the element together with switching; and subclass 179 for such resistors

with a rectilinearly slidable contact and a series switch. See also (1) Note above.

- 185+, for mechanically variable resistors of the tap type involving a switch. See also (1) Note above.
- 200+, for mechanically variable resistors generally with a switch. See also (1) Note above.
- 334, for resistors connected electrically to other electrical devices, and not otherwise classifiable.

## SEE OR SEARCH CLASS:

- 123, Internal-Combustion Engines, subclass 148 for high tension ignition systems, including a combined distributor and resistor.
- 218, High-Voltage Switches With Arc Preventing and Extinguishing Devices, subclasses 1+ for switches with shunt resistors for contact arc preventing or extinguishing.
- 219, Electric Heating, especially subclass 482 for heating systems involving the combination of a switch and resistors. See also (1) Note above.
- 307, Electrical Transmission or Interconnection Systems, subclasses 112+ for miscellaneous switching systems which may include a resistor and a switch.
- 361, Electricity: Electrical Systems and Devices, subclass 58 for safety and protection systems which may include a resistor and a switch.

**216** This subclass is indented under the class definition. Subject matter including a wave guide or coaxial transmission line, the resistor or element thereof lying within the outer sheath of the wave guide or coaxial line.

- (1) Note. Where the line or wave guide is limited to electrical use as by recitation of electrical dimensions, or where impedance matching structure is included as a quarter wave stub or a particular shape of the resistor for impedance matching purposes as tapered ends, classification is in Class 333, Wave Transmission Lines and Networks. For classification in this subclass (216), only a nominal wave guide or coaxial line, or

mechanical limitations which do not restrict the line or wave guide to electrical use, need be recited.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 20+, for resistors whose value is responsive to electrical current and/or voltage, and incased in a wave guide or coaxial line.
- 64+, for resistors with electrical shielding.
- 138+, and 217+, for tapered resistors.
- 220+, for a resistor in a detachable electrical connector.
- 226+, for incased, embedded or housed resistors generally.

**SEE OR SEARCH CLASS:**

- 324, Electricity: Measuring and Testing, subclass 95 for electrical measuring devices including a resistor in a wave guide or long line, as for example devices for measuring radio frequency power by measuring the change in value of a resistor due to this power.
- 333, Wave Transmission Lines and Networks, subclass 22 for dissipating terminations for long lines, some electrical limitation of the line or coupling being recited, as a tapered resistance for impedance matching purposes; subclasses 32+ for coupling devices with impedance matching; subclass 81 for attenuators; subclasses 84+ for electrically long lines; and subclasses 97+ for long line elements and components. See also (1) Note above.

**217** This subclass is indented under the class definition. Subject matter wherein a physical dimension or characteristic of the element changes in one direction gradually or in a plurality of discrete progressive steps along the element from one terminal towards the other.

- (1) Note. Usually the change in physical dimension or characteristic is for modifying the resistance value along the element between terminals, or to maintain this value uniform along the element between terminals to compensate for some other effect. The change must occur progressively in one direction, and

as a minimum must occur in two distinct steps.

- (2) Note. Class 219, Electric Heating, especially subclasses 538+, provides for resistors having a shape, configuration, or arrangement to produce a particular pattern of heat distribution. However, as between this class (338) and Class 219, the mere recitation of the term "tapering" or the equivalent as a characteristic of the resistance element does not preclude classification in this class (338). For classification in Class 219 a more detailed recitation of the shape of the resistance element is necessary as having a plurality of tapers one at each end of the element, or a plurality of elements arranged with a tapered spacing, and resulting in a particular heating pattern.
- (3) Note. Examples of the subject matter of this subclass are resistors whose elements are formed as a coating with the coating thickness progressively increasing or decreasing, resistors wherein the chemical composition of the element gradually changes over its length, and resistors whose element has a gradually changing physical dimension.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 89+, for mechanically variable resistors wherein some significant mathematical relationship lies between the mechanical adjustment or variation and the resistance value.
- 138+, for tapered mechanically variable resistors.
- 216, for resistors in a coaxial transmission line or wave guide, which resistors may be tapered.
- 333, for resistors of a particular configuration.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, especially subclasses 538+ for resistors having a shape or arrangement to produce a particular heating pattern. See also (2) Note above.

- 333, Wave Transmission Lines and Networks, subclass 9 and 34, for impedance matching coupling networks which may include a tapered resistor.

**218.**

This subclass is indented under subclass 217. Subject matter wherein the resistance element is of the helical or wound type as defined in subclass 296 below.

- (1) Note. The diameter of the turns of the helix or winding or the spacing between the turns may change to produce the taper.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 141, for mechanically variable resistors whose resistance element is of the helical or wound type and tapered.  
296+, for resistors of the helical or wound type generally.

**219**

This subclass is indented under the class definition. Subject matter including a lamp socket or lamp base together with a resistor positioned within the socket or base or mounted directly on and in engagement with the surface of the socket or base and in circuit with the terminal or terminals of the socket or base, and not otherwise classifiable.

- (1) Note. The lamp base or socket to receive the lamp is usually of the type classifiable as such in Class 439, Electrical Connectors. Usually when structure in addition to that classified in Class 439 is recited, as relating to Class 362, Illumination, or Class 340, Communications: Electrical, classification is not in this subclass (219) or in Class 439, but in the more comprehensive subclass. See the Search Notes under Classes 313 and 439 for a statement of the classification lines between Class 439 and other classes relating to lamp bases and sockets. The resistor must be in intimate relationship with the socket or base as being contained therein or in a surface recess for classification in this subclass (219). A mere electrical connection between the resistor and the socket or base or a remote mounting of the resistor on the

socket or base is not sufficient for classification here. Subclasses 315+ provides for resistors with mounting or supporting means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 70+, for mechanically variable resistors in or on a lamp socket.  
216, for resistors in a coaxial transmission line or wave guide.  
220, for resistors in a detachable electrical connector.  
221, for detachable plug type resistor units.  
226+, for incased, embedded, or housed resistors.  
315+, for resistors with mounting or supporting means. See also (1) Note above.

SEE OR SEARCH CLASS:

- 313, Electric Lamp and Discharge Devices, appropriate subclasses, for electric lamp and discharge devices. See also (1) Note above.  
315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for electric lamp and discharge device systems, which may include a resistor as an element of the system.  
340, Communications: Electrical, especially subclasses 84+ and 366+, for communication systems which may include a resistance and lamp socket or base together with other communication structure. See also (1) Note above.  
362, Illumination, appropriate subclasses, for illuminating devices which may include a resistor as an element thereof with illumination structure. See also (1) Note above.

**220**

This subclass is indented under the class definition. Subject matter including a detachable electrical connector, and a resistor or element thereof being disposed within the connector and in circuit with the terminal or terminals of the connector.

- (1) Note. Usually the resistor or element thereof is disposed within an insulating housing or casing of the connector. The

resistor or element for classification here must be disposed within some connector structure. Where the resistor is merely mounted externally on the connector or electrically connected thereto, classification is not here. Subclasses 315+ provides for resistors with mounting or supporting means. As between Class 439, Electrical Connectors, and this subclass (220) the claimed recitation of a resistor enclosed in a detachable electrical connector is sufficient for classification in this subclass (220). However, for classification here the complete resistor (element and terminals) must either be claimed, or it must be evident from the context that such a complete resistor be intended in the claim, in addition to the detachable electrical connector. In short this subclass provides for the combination of a distinct detachable electrical connector and a distinct resistance therein. A mere resistance element and its terminals is classified in subclasses 322+ below. The combination of a resistance element nominally recited and a single detachable connector as a terminal of this element is classified in Class 439, Electrical Connectors; or Class 174, Electricity: Conductors and Insulators, if the element be a conduit or cable and no detachable connector is present, but rather a more permanent connection such as a joint. See also (1) Note under subclass 226 and (2) Note under subclass 238.

- (2) Note. The term electrical connector as here used denotes a device which makes an electrical connection between two electrical circuits external thereto, as opposed to a mere plug-in resistor unit as classified in subclass 221 below which merely makes an electrical connection with the resistance element which is a part of the unit.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 219, for resistors in or on a lamp socket or base.  
221, for detachable plug-in type resistor units. See (2) Note above.

226+, for incased, embedded or housed resistors.

315+, for resistors with mounting or supporting-means. See also (1) Note above.

**SEE OR SEARCH CLASS:**

174, Electricity: Conductors and Insulators, especially subclasses 74+ and 84, for conduits and cables with end structure or joints, the conduit or cable being nominally resistive. See also (1) Note above.

**221** This subclass is indented under the class definition. Subject matter wherein the resistor has terminal structure which is readily detachable from the associated terminals, and which terminal structure constitutes the resistor mounting means, the resistor being readily separable as a unit from the associated terminals.

- (1) Note. As all resistors must have some type terminal or connector in order to be connected in a circuit for use, it is necessary that the terminal structure be significant, as by being included in the patent claim. Usually the terminal structure constitutes parallel prongs or a screw plug. See also (2) Note under subclass 220 above.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 76, for interchangeable resistors of different resistance values.  
77, for plug box type resistance units.  
220, for a detachable electrical connector having a resistor therein. See also (2) Note under subclass 220.  
322, for resistors whose terminals have detachable connectors other than the connections to the resistance element.

**SEE OR SEARCH CLASS:**

219, Electric Heating, especially subclasses 542+ for electric heaters having detachable resistor units.

**222** This subclass is indented under the class definition. Resistors wherein the resistance element is a liquid.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 27, for resistors whose element is a liquid responsive in resistance value to ambient temperature; subclass 38 for such resistors actuated by fluid or gas pressure; and subclass 44 for such resistors gravity stabilized or inertia actuated.
- 56, for a liquid resistance element which is cooled by circulation.
- 80+, for variable liquid resistors.
- 156, for a mechanically variable resistor with a liquid contact adjustable over the length of the resistance element.
- 231, for a resistor whose element is incased, embedded or housed in a liquid.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclass 9 for liquid conductors.

**223** This subclass is indented under the class definition. Subject matter wherein the resistance element is granular or powdered in final form.

- (1) Note. Subject matter wherein an inert, granular grain base material is impregnated or coated with a resistive layer such that a resistive film or coating is formed on the individual granular base grains, is properly classified in this subclass, unless otherwise provided for above.
- (2) Note. When the element is formed as a compacted mass of powdered or granular material classification is in this subclass, if some retaining means such as a casing is required to maintain the mass in its formed shape, i.e., the compacted mass crumbles to a powder or to grains when the retaining structure is removed.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1, for coherer type resistors whose element is granular or powdered.
- 54, for resistors with granular or powdered elements and with cooling gas or liquid circulation.

- 88, for penetrating type mechanically variable resistors having powdered elements.
- 100, for a compressible type variable resistor whose element is granular or powdered.

## SEE OR SEARCH CLASS:

- 75, Specialized Metallurgical Processes, Compositions for Use Therein, Consolidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclasses 228+ for a consolidated metal powder composition.
- 178, Telegraphy, subclass 117 for alternating or pulsating current telegraphy systems using a coherer.
- 219, Electric Heating, subclass 552 for electric heaters including granular or powdered resistors.
- 361, Electricity: Electrical Systems and Devices, subclasses 126+ for high voltage dissipators which may include a granular or powdered resistor.

**224** This subclass is indented under subclass 223. Subject matter wherein the granular or powdered element consists of a mixture of two or more different materials, each material being granular or powdered in the final state.

- (1) Note. Subject matter in this subclass (224) usually consists of a conductive powdered material mixed with one or more powdered insulative materials. However, a mixture of two or more resistive materials in a powdered form is properly classified here.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 7+, for a resistor using diverse material to compensate for temperature change.

**225** This subclass is indented under subclass 223. Subject matter wherein the granular or powdered material constituting the resistor element is substantially pure carbon.

- (1) Note. Where the granular material is a carbon compound, classification is not here, but in the generic subclass 223 above.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 1, for a coherer type resistor with granular carbon particles.

**226** This subclass is indented under the class definition. Subject matter wherein the resistance element is substantially completely covered or surrounded with a solid, liquid, or gaseous substance or a vacuum layer to provide a barrier or separation between the element and the outside, or together with any structure maintaining such substances or layer around the resistor.

- (1) Note. A resistive wire, coiled resistive wire, wire of resistive metal, or wire of no significant resistive composition is classified in Class 174, Electricity: Conductors and Insulators, especially subclasses 110+. Where the covered wire includes structure other than a mere coil, which is peculiar to resistance or heating, such as a zigzag shape, or where the wire is of a nonmetallic composition such as carbon, or of a significantly resistive composition such as iron, classification is in this class (338), especially subclasses 314+. Electrically conductive or resistive wire with an insulating coating is classified in Class 428, Stock Material or Miscellaneous, Articles, subclasses 375+, even if no structural limitations are recited. Metal coated conductive or resistive metal bases as compound metal stock are classified in Class 29, Metal Working, subclasses 194+. See also (2) Note under subclass 238 below.

- (2) Note. Resistors claiming heat insulating or heat conducting casings or housings are classified here. The combination of a resistance used for heating purposes surrounded or incased by the structure to be heated or for distributing, directing, or concentrating the heating by the resistance is classified in Class 219, Electric Heating, especially subclasses 19+. See also ELECTRICAL RESISTANCE HEATERS in the Class Definition.

- (3) Note. A resistor with a casing or housing claimed as an electrical shield or

equivalent terminology is classified elsewhere (see the Search This Class, Subclass notes below).

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 12, for a resistor actuated by a movable magnet through a housing or partition.  
 19, for photoconductive resistors with a transparent housing.  
 53+, for resistors with cooling gas or liquid circulation.  
 57, for resistors in a ventilating or vented casing.  
 64+, for resistors with electrical shielding. See also (3) Note above.  
 66+, for ignition interference suppression type resistors.  
 77, for plug boxes.  
 161, for a mechanically variable resistor whose element is incased, the casing being partly removed to form a track for the contact.  
 163, 164, 184, and 199, for mechanically variable resistors with housings.  
 210+, for flexible or folding resistors; and especially subclass 211 for impregnated flexible resistors; subclass 212 for tape or sheet resistors; and subclass 214 for cable type resistors.  
 216, for a resistor in a coaxial transmission line or wave guide.  
 220, for a resistor in a detachable electrical connector.  
 223+, for granular or powdered resistors.  
 310, for resistors whose element extends through a base.  
 332, for a resistor whose terminal embraces or surrounds the resistance element.

SEE OR SEARCH CLASS:

- 166, Wells, subclass 60 for electric heaters situated below ground level.  
 174, Electricity: Conductors and Insulators, subclasses 17+ and 50+, for boxes and housings limited by claimed structure to electrical use and not otherwise classifiable; and subclasses 68+ for conduits, cables, and conductors which may be embedded, incased or housed. See also (1) Note above.



- 219, Electric Heating, subclasses 463.1+ for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) formed by a heating unit having a tubular shape, subclass 468.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating element is embedded in the planar support surface, or subclasses 535+ for a heater unit housing, casing, or support means (e.g., frame and a single sheet, etc.) that is specially formed or adapted to fit material to be heated (e.g., a pipe, etc.).
- 220, Receptacles, subclasses 2.1+ for envelopes for electric lamps or similar devices; and subclasses 3.2+ for outlet or junction box type receptacles.
- 336, Inductor Devices, subclasses 90+ for an inductor device with an outer casing or housing.
- 227** This subclass is indented under subclass 226. Subject matter including marks, tags, colors, or other structure or configuration, usually on the exterior of the casing or housing to provide a visual indication of the resistance value of the resistance element within the housing.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 119, for variable resistors having a contact position indicating lamp.
- 196, for variable resistors having a resistor actuator position indicator.
- SEE OR SEARCH CLASS:
- 40, Card, Picture, or Sign Exhibiting, appropriate subclasses, for information displaying structure generally.
- 228** This subclass is indented under subclass 226. Subject matter wherein a casing or housing, which is usually elongated and cylindrical, extends through a plate, wall, or similar structure whose thickness is less than the length of the casing or housing, the casing or housing being secured to the plate or wall.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 28+, for probe type resistors whose resistance value is responsive to ambient temperature.
- 229, for resistors in a probe or line connector.
- SEE OR SEARCH CLASS:
- 174, Electricity: Conductors and Insulators, subclass 18 and 50+ for boxes and housings within which a conduit or cable may extend; subclasses 48+ for wall mounted conduits; and subclasses 151+ for insulators extending through a wall or plate.
- 285, Pipe Joints or Couplings, subclasses 189+ for a pipe joined to a plate.
- 229** This subclass is indented under subclass 226. Subject matter wherein the casing or housing is formed as a single thin elongated member, such as a tube, one end being closed over the resistance element, with flexible leads externally connected or joined to terminals or with leads extending into the other end of the member for connection to the resistance element, together with structure or configuration, such as a handle or a particular shape of the member, which permits or facilitates free movement of the elongated member with the resistance element therein.
- (1) Note. Most of the patents in this subclass are subcombinations of instruments adapted to perform particular functions such as thermometers, immersion heaters, and soldering irons, no significant structure being claimed relating to the performance of these functions.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 28+, for probe type resistors whose resistance value is responsive to ambient temperature. See also (1) Note above.
- 228, for probe type resistors extending through and secured to a wall or plate.
- 315+, for resistors with supporting handles.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclasses 538+ for electric heaters formed as probes,

- especially subclasses 850+ for soldering irons; and subclass 437 for immersion fluid heaters. See also (1) Note above.
- 324, Electricity: Measuring and Testing, subclass 149 for electrical testing or measuring devices with probes or prods.
- 230** This subclass is indented under subclass 226. Subject matter wherein the casing or housing or one layer of the casing or housing is formed of metal which is cast in situ around the resistance element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 248, and 250, for resistors whose element is in insulation with an outer metallic sheath, the insulation being formed and hardened in situ, as by molding.
- 253, for resistors whose element is embedded or enclosed in a groove or recess with a filling hardened in situ.
- 269, and 275, for incased, embedded, or housed resistors generally whose casing or housing is formed on and hardened on the resistor, such as by molding.
- 231** This subclass is indented under subclass 226. Subject matter wherein the resistance element is incased or enclosed in a liquid.
- (1) Note. The liquid need not directly engage the element for classification here, but may be separated from the element by a solid housing layer.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 55, for a resistor which is cooled by a circulating liquid medium.
- 80+, for mechanically variable resistors whose element is a liquid.
- 222, for resistors generally whose element is a liquid.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclasses 280+ for fluid heaters.
- 232** This subclass is indented under subclass 226. Subject matter wherein the casing or housing is in two or more parts which are readily openable or separable as to provide access to or to permit removal of the resistance element, and/or wherein the casing or housing together with the element includes structure or has a configuration to permit removal or separation of the element from the casing or housing.
- (1) Note. For classification here the casing may be formed in two parts as a box and cover. The parts may be secured together by screw threads, snaps, or by gravity with the resistor positioned for gravity to maintain a closing effect on the two parts. The element and casing may also include this structure to permit ready separation.
- SEE OR SEARCH CLASS:
- 220, Receptacles, subclass 3.8 for outlet or junction box type receptacles with closures; and subclass 24 for closures.
- 233** This subclass is indented under subclass 232. Subject matter wherein the casing or housing is formed as an elongated tube with an open end, and includes a plug, disc, or cap, which is readily separable from the remainder of the casing or housing, closing the otherwise open end.
- (1) Note. The resistance element or terminal may form this plug, disc, or cap.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 331, for incased, embedded, or housed resistors, wherein the terminal or lead extends into the end of an elongated casing or housing, and including a sealing plug, disc, or cap.
- 234** This subclass is indented under subclass 226. Subject matter wherein a vacuum or gaseous spacing exists between the outer surface of the resistance element and the inner surface of the external casing or housing.
- (1) Note. For classification in this subclass, the gaseous or vacuum spacing must extend over substantially the entire adja-

cent surfaces of the external casing or housing and element. There must be no direct contact between the element and casing or housing. However, the intervening space need not be entirely gaseous or vacuum. Spacing elements may be inserted between the element and casing or housing to maintain the spaced relation, provided only a relatively small portion of the vacuum or gaseous space is devoted to this purpose. Where the casing is extended through the interior of the resistance element, the element may directly engage the portion extending therethrough, as being wound thereon, and yet be classified in this subclass. Air spacing is considered to be gaseous spacing.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 34, for resistors whose value is responsive to gas, vapor, or moisture.
- 36+, for resistors whose value is responsive to a fluid or gas pressure.
- 53+, for resistors in a gas cooling medium or with ventilated passages.
- 57, for resistors with a vented or ventilating casing or housing.
- 231, for resistors whose element is embedded, incased, or housed in liquid.
- 238+, for resistors whose element is embedded in powdered insulating material with an outer metallic sheath.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclasses 17+ for boxes and housing with a fluid or vacuum and limited to electrical use; and subclasses 50.5+ for hermetically sealed envelope type boxes and housings.
- 219, Electric Heating, subclasses 366+ for electric heaters utilizing gaseous or vacuum spaces, as to control the direction of the heat.
- 313, Electric Lamp and Discharge Devices, for electric lamp and discharge devices utilizing an envelope enclosing a vacuum or gaseous space.

- 235** This subclass is indented under subclass 234. Subject matter, wherein a plurality of resistors or elements for resistors are enclosed in a cas-

ing or housing with a vacuum or gaseous spacing between the outer surface of each of the resistors or elements and the inner surface of the external casing or housing.

- (1) Note. The gaseous or vacuum spacing need not extend between the individual resistors or elements for classification in this subclass.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 260+, for plural incased, embedded or housed resistors generally.
- 320, for plural supported resistors generally. See also the Search Notes under this subclass for a more complete field of search for plural resistors.

- 236** This subclass is indented under subclass 234. Subject matter wherein the gaseous or vacuum spacing is of uniform thickness over the length of the resistance element.

- (1) Note. The subject matter of this subclass usually involves a cylindrical or flat resistance element as formed by a rod-like resistance mass or a cylindrical or flattened cylindrical helix, with the uniform spacing extending between the outer surface of the element and the inner surface of the casing or housing. The spacing need not be uniform around the periphery of the resistance element, as when a flat resistance element is inclosed in a casing or housing whose inner surface is circularly cylindrical, for classification in this subclass.

- 237** This subclass is indented under subclass 236. Subject matter wherein the gaseous or vacuum spacing is completely sealed from the exterior of the resistor, as to prevent the passage of any gas or moisture.

- (1) Note. The sealing for classification in this subclass must be something more than a mere tight fit between surfaces of the element, terminals, and/or casing, as by a plug. The subject matter classified here usually involves some bonding between the surfaces, as produced by cementing, soldering, or fusing.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 164, for mechanically variable resistors with an angularly slidable contact and a hermetically sealed housing.
- 248, 250, 269, and 275, for resistors at least part of the casing or housing thereof being formed and hardened on the resistor, e.g., molded.
- 257, and 262+, for resistors at least part of the casing or housing thereof being formed as a coating.
- 274, for resistors whose terminal extends into an end of an elongated casing or housing with a sealing plug, disc, or cap.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 17+ and 50.5+ for hermetically sealed boxes and housings limited by claim to electrical use.

**238** This subclass is indented under subclass 226. Subject matter wherein the casing or housing constitutes a metallic sheath with powdered insulation therein, the resistance element being embedded in the powdered insulation and insulated from the metallic sheath.

- (1) Note. The insulation must be in powdered form in the finished resistor, as opposed to being added in powdered form and hardened as by molding, the latter subject matter being in subclasses 243+ below. However a compacted mass of powder is still considered powder for classification here, if the mass breaks down into powder upon removal of any restraining structure.
- (2) Note. See the search note to Class 174, below for the line with this subclass and its indented subclasses.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 54, 88, 100, and 223+, for resistors with granular or powdered elements.
- 64+, for resistors with electrical shielding.
- 214, for cable type resistors. 243+, for resistors generally whose element is

embedded in insulation with a metallic sheath.

- 256+, for incased, embedded, or housed resistors, the casing or housing being in plural layers.
- 277+, for resistors with mechanical protecting structure such as a guard, screen, or shield.

## SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 614+ for methods of making and assembly of resistors involving enveloping by filling with powdered insulation; and subclasses 616+ for such methods involving the powdering insulation.
- 156, Adhesive Bonding and Miscellaneous Chemical Manufacture, subclasses 47+ for making and/or joining of electrical conductors of indefinite length.
- 174, Electricity: Conductors and Insulators, especially subclasses 74+ for conduits, cables and conductors with end structure; subclass 98 with embedded conduit-duct or conductor; and subclasses 102+ for conduits, cables, or conductors with conductive armor or sheath. Subclasses 102+ include cables with a conductor, metallic sheath, and powdered insulation therebetween. Subclass 75 includes cables of this type with end structure and joint, and in subclass 77 cables of this type with end structure and seal. The mere recitation of such terms as resistance, resistance element, helical resistance, coil resistance, or a terminal at one end of the sheathed resistor does not preclude classification in these subclasses as opposed to these subclasses (238+). For classification in subclasses 238+ significant resistance structure or configuration must be recited, as the resistor having a zigzag pattern, or wound on a core. The recited combination of a resistor broadly with a terminal at each end is classified in subclasses 238+ as opposed to Class 174. However, where a resistor is disclosed, but is only claimed as conductor, or wire, or in similar nomenclature, together with one or

- more terminals classification is in Class 174, especially subclasses 70+.
- 219, Electric Heating, subclasses 200+ and especially subclass 546+ for electric heaters with a metallic sheath over powdered insulation.
- 252, Compositions, subclass 63.2 for powdered dielectric or electrically insulating compositions.
- 239** This subclass is indented under subclass 238. Subject matter wherein two or more physically separate and distinct resistance elements are embedded in powdered insulation in a common metallic sheath, or including two or more resistors each being as defined in subclass 238 above, i.e., each resistor includes a distinct metallic sheath containing a resistance element embedded in powdered insulation.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 260+, for plural incased, embedded, or housed resistors generally.
- 320, for plural resistors with mounting or supporting means. See also the Search Notes under this subclass for a more complete field of search for plural resistors.
- 322, for plural resistance elements in parallel between terminals.
- 240** This subclass is indented under subclass 238. Subject matter wherein structure is provided to position the resistance terminals or leads so that the spacing therebetween is small relative to the overall resistor dimensions.
- (1) Note. Examples of the subject matter in this and the indented subclass are where the terminals are side by side or coaxial at one end of a resistor, as where the resistance element is looped, or where a connection between the terminal extends through a helical resistor, all being embedded in powdered insulation with a metallic sheath. For classification here definite structure must be provided to maintain the terminals adjacent, such as insulation joining the terminals or structure joining the ends of the metallic sheath. An elongated resistor with terminals at its ends and bent to position the terminals adjacent is not classified in this subclass, but in subclass 238 above.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 238, for resistors whose element is embedded in powdered material with a metallic sheath, the resistor being elongated and the terminals being at opposite ends of the sheath. See also (1) Note above.
- 265, for resistors whose casing or housing is formed as a coating, the element being coiled on a core with the terminals or leads at one end of the core.
- 271, for resistors whose terminal forms a casing or housing.
- 326, for resistors generally whose terminals are adjacent.
- 241** This subclass is indented under subclass 240. Subject matter wherein the metallic sheath surrounds or closes around the loop formed by the resistance element and/or leads without extending into the space between the ends of the loop or into the bight of the loop, i.e., the sheath surrounds the loop as a unit, as opposed to a sheathed elongated resistance element with the sheath and element being together bent into a loop.
- 242** This subclass is indented under subclass 238. Subject matter wherein the metallic sheath has a significant cross-sectional or overall shape.
- (1) Note. Examples of a significant shape for classification in this subclass are sheaths of triangular or polygonal cross section.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 333, for resistors of particular configuration generally.
- 243** This subclass is indented under subclass 226. Subject matter wherein the resistance element is substantially entirely enclosed in an insulating layer, which is either a solid mass of insulating material or a noninsulating material coated or otherwise covered with insulation to present an insulated surface, and a metallic layer substantially entirely surrounding or

enclosing the insulating layer to provide a sheath.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 64+, for resistors with electrical shielding.
- 216, for a resistor in a coaxial transmission line or wave guide.
- 238+, for resistors whose element is embedded in powdered insulation with a metallic sheath.
- 256+, for resistors generally whose casing or housing is in plural layers external to the element.
- 277, for resistors with mechanically protecting structure.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 35+ for anti-inductive shields or screens not otherwise classified. See also the Search Notes under this subclass.

**244** This subclass is indented under subclass 243. Subject matter wherein the insulation constitutes a conductive liner, as of metal, within the metallic sheath and between the sheath and the resistance element, the liner being coated with insulating material to present an insulated surface to the sheath and resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 245, for resistors enclosed in insulation with a metallic sheath, the entire insulation and/or entire metallic sheath being formed as a coating.

**245** This subclass is indented under subclass 243. Subject matter wherein the entire insulation and/or the entire sheath constitutes a coating or coatings.

- (1) Note. The insulation may be coated on the resistance element or on the interior of the sheath, or the sheath may be coated on the exterior surface of the insulation. The insulation or sheath may be formed as a plurality of coatings. However, where in addition the insulation or sheath includes a noncoating layer as well as a coated layer, classifica-

tion is not in this subclass but elsewhere under subclass 243.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 244, for resistors whose element is in insulation with an outer metallic sheath, the insulation being coated on a metallic liner.
- 248, and 250, for resistors whose element is in insulation with an outer metallic sheath, the insulation being formed and hardened in the metallic sheath and/or on the element, as by molding.
- 262+, for a resistor whose casing or housing is formed as a coating.

**246** This subclass is indented under subclass 243. Subject matter wherein the resistance element has an opening therethrough, as by having a tubular or annular shape, the insulation and sheath extending through the opening to cover the inner surface of the resistance element, as well as extending over and covering the outer surface.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 53+, for resistors with ventilating passages.

SEE OR SEARCH CLASS:

- 166, Wells, subclass 61 for wells with heating resistors surrounding production tubes through which a liquid flows.

**247** This subclass is indented under subclass 243. Subject matter wherein the metallic sheath is formed in two or more parts secured together.

- (1) Note. Usually in this subclass the parts are permanently secured together, as by welding, bending, or riveting. Examples of the subject matter in this subclass are a capped tubular sheath, a two part sheath with one or both parts being channel shaped, or a two part sheath with one part recessed and the other part constituting a cover for the recess.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 232+, for incased, embedded, or housed resistors whose casing or housing is

- readily openable or separable from the element.
- 252+, for resistors whose element is embedded or enclosed in a groove or recess.
- 256+, for resistors with a plural layer casing.
- 274, for incased, embedded, or housed elongated resistors with a sealing plug disc or cap, the leads or terminals extending into the ends of the casing or housing.
- 248** This subclass is indented under subclass 247. Subject matter wherein the insulation is formed between the resistance element and metallic sheath and hardened in this position; or wherein the insulation is formed on and hardened on the resistance element or in the metallic sheath, the other of the resistance element and metallic sheath being later placed on the formed insulation.
- (1) Note. In this subclass the insulation is usually molded or vitrified in position. Where the insulation is hardened in a preformed mass and then applied to the sheath and element, classification is not in this subclass, but in the generic subclass 247, above.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 244, and 245, for resistors whose element is in insulation with a metallic sheath, the insulation constituting a coating.
- 250, for resistors generally whose element is in insulation with a metallic sheath, the insulation being formed or hardened in situ.
- 269, and 275, for incased, embedded, or housed resistors not classified above, the casing or housing being formed on and hardened on the resistor, e.g., molded.
- 249** This subclass is indented under subclass 247. Subject matter wherein the metallic sheath is formed as two substantially flat sheets secured together with the resistance element and insulation disposed between the sheets.
- (1) Note. Usually in this subclass the insulation is also composed of flat sheets with a flattened resistance element disposed between the sheets. A slight bending of the sheets to close the spaces adjacent the edges of the sheets is still considered substantially flat for classification in this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 212, for flexible or folding resistors of the sheet type.
- 251, for resistors whose element is in insulation with an outer metallic sheath, the metallic sheath being in one piece and bent or folded over the insulation to form a flat surface on each side of the insulation.
- 254+, for a flattened resistor whose element is disposed between flat layers.
- 250** This subclass is indented under subclass 243. Subject matter wherein the insulation is formed between the resistance and the metallic sheath and hardened in this position; or wherein the insulation is formed on and hardened on the resistance element or in the metallic sheath, the other of the resistance element and metallic sheath being placed on the formed insulation.
- (1) Note. In this subclass the insulation is usually molded or vitrified in position. Where the insulation is hardened in a preformed mass and then applied to the sheath and element, classification is not in this subclass, but in the generic subclass 243 above.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 244, and 245, for resistors whose element is in insulation with a metallic sheath, the insulation constituting a coating.
- 248, for a resistor whose element is in insulation with a plural part metallic sheath, the insulation being formed or hardened in situ.
- 269, and 275, for incased, embedded, or housed resistors not classified above, the casing or housing being formed on and hardened on the resistor, e.g., molded.
- 251** This subclass is indented under subclass 243. Subject matter wherein the metallic sheath is formed as a sheet and surrounds the solid insu-

lation, the two opposite sides of the sheet either substantially meeting or overlapping.

- (1) Note. In this subclass the metallic sheath is usually formed as a C, the ends of the C substantially meeting or overlapping around the solid insulation; or the metallic sheath is formed a bendable sheet, and is wrapped around the solid insulation with some overlapping.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 259, for incased, embedded, or housed resistors, the casing or housing being wound over the resistance element.

**252** This subclass is indented under subclass 226. Subject matter wherein the resistance element is disposed in a groove, slot, or recess, or in a channel shaped container.

- (1) Note. The walls of the recess or groove when open on one side do not completely enclose the resistance element; and such subject matter above is not classifiable here, but in subclasses 285, 303, and 311 below. Some other structure is necessary in addition such as a sheath on the element, or a cover on the open face of the recess or groove for classification here.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 161, for a mechanically variable incased resistor whose casing is partly removed to form a track for the contact.
- 232, for incased, embedded, or housed resistors whose casing or housing are readily openable and/or separable from the resistance element.
- 247, for embedded or enclosed resistors having a metallic sheath formed in separate parts, one part being recessed or channeled.
- 285, for a zigzag or sinuous resistor whose element extends along a groove in a base.
- 303, for a helical or wound resistor whose element is coiled in a groove on a core.

- 311, for a resistor generally whose element is mounted in a groove in a base.

**253** This subclass is indented under subclass 252. Subject matter wherein the groove or recess contains a filling which is molded or otherwise hardened in place and which fills the space between the resistance element and the wall of the groove or recess and/or which closes the open side of the groove or recess.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 248, for embedded or enclosed resistors having a metallic sheath formed in separate parts, one part being recessed or channeled with solid insulation hardened or molded in the recess channel.
- 269, and 275, for incased, embedded, or housed resistors, whose casings or housings are formed on and hardened on the element, such as being molded.

**254** This subclass is indented under subclass 226. Subject matter wherein the resistance element is flat in shape, as in a planar zigzag resistance element or a helical resistance element wound on a flat ribbon, and wherein the casing or housing is formed as two flat preformed layers, the resistance element being disposed between and substantially enclosed by the layers.

- (1) Note. Usually additional structure is provided as bolts, screws, or clamps for securing the layers together.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 212, for flexible or folding resistors formed as tapes or sheets.
- 249, for a resistor which is embedded in insulative material surrounded by a plural part metallic sheath formed of flat sheets.
- 268, for a helical or wound resistor whose element is coiled on a core, with a preformed sleeve surrounding the element.

**255** This subclass is indented under subclass 254. Subject matter wherein the layers are fastened to one another as by fusing, vulcanizing or



other intimate bonding of all or part of the layer surfaces.

- (1) Note. Where the layers are merely secured together by an adhesive such as glue, classification is not in this subclass, but in the generic subclass 254 above. Where the two layers are intimately bonded together to be integral, the structure of the casing or housing in this subclass may resemble the corresponding structure in subclass 275 below. In this subclass 255 the layers are preformed and applied to the resistance element as layers to be then fastened together. While in subclass 275 below the casing or housing is usually applied as a plastic mass and then hardened in place. Usually in subclass 275 due to the nature of the molding or hardening process the casing or housing is intimately associated with or adheres to the surface of the resistance structure which it surrounds, while in this subclass 255 this is unnecessary.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 212, for flexible or folding sheet or tape resistors whose casing layers are fused or coalesced together.  
269, and 275, for a resistor whose casing or housing is formed on and hardened on as by molding. See also (1) Note above.

**256** This subclass is indented under subclass 226. Subject matter wherein the casing or housing is formed as a plurality of layers, each layer in itself substantially completely surrounding the resistance element.

- (1) Note. The inner layer adjacent the resistance element may extend within the resistance element, as when the inner layer is molded to a helical resistance element whose coils are spaced, and yet be classified in this subclass. It is only necessary that two covering layers be provided, and that the layers be positioned between the exterior of the resistance element and the exterior surface of the resistor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 231, for resistors incased, embedded or housed in plural layer casings or housing where one of the layers is a liquid.  
234+, for resistors incased, embedded, or housed in plural layer casings or housing where one of the layers is a gaseous or vacuum space.  
238+, for resistors embedded or enclosed in powdered material with a metallic sheath.  
243+, for resistors embedded or enclosed in solid material with a metallic sheath.

**257** This subclass is indented under subclass 256. Subject matter wherein one or more of the layers constitute a coating.

- (1) Note. The coating layer may be coated on one of the other casing or housing layers or on the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 262+, for resistors generally whose casings or housings are formed as a coating.

**258** This subclass is indented under subclass 226. Subject matter, wherein the resistance element is formed as a coating on the interior surface of the casing or housing.

- (1) Note. Usually in this subclass the casing or housing is formed as a hollow insulating tube with the resistance element coated on the inside.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 55, for a resistor whose element is coated on the interior of the casing with liquid circulating through the resistance.  
262+, for a resistor whose casing is formed as a coating.  
308+, for a resistor whose element is coated on a base.

**259** This subclass is indented under subclass 226. Subject matter, wherein the casing or housing is formed of a braided, wound or woven material; or wherein the casing is braided, wound, or woven on the inner resistance structure.

- (1) Note. Where the wound, woven, or braided material is impregnated with other material, classification is in this subclass.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 208, for a resistor whose element is formed as a mesh, weave, or braid.  
 209, extensible resistors.  
 210+, for flexible or folding resistors.
- 260** This subclass is indented under subclass 226. Subject matter, including a plurality of resistors (each having separate and distinct resistance element and terminals) as defined in subclass 226 above which are supported or otherwise related to form a unitary structure; or a plurality of resistors (each having separate and distinct resistance elements and terminals) which are embedded, incased or housed in a common casing.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 48, for plural separate diverse resistors.  
 203, for structure readily severable into a plurality of independent resistors.  
 235, for plural incased, embedded, or housed resistors or elements with a gaseous or vacuum spacing between the elements and the casing or housing.  
 239, for plural resistors or elements of the type where the element is in powdered insulation with an outer metallic sheath.  
 320, for plural resistors with a mounting or supporting means. See also the Search Notes under this subclass for a more complete field of search involving plural resistors.
- 261** This subclass is indented under subclass 260. Subject matter wherein at least one of the resistors is of the helical or wound type as defined in subclass 296 below.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 263+, and 267+, for single incased, embedded, or housed helical or wound resistors.
- 296+, for helical or wound resistors generally. See also the Search Notes under this subclass for a more complete field of search for helical or wound resistors.
- 262** This subclass is indented under subclass 226. Subject matter wherein the casing or housing is formed as a coating.
- (1) Note. A casing or housing formed as a coating in this subclass is usually a thin layer or uniform thickness, the external shape of the coating being similar to the shape of the surface covered. While a casing or housing formed and hardened on the resistor such as molded, in subclass 275 below, usually involves a relatively thick covering, whose external surface has a shape distinct from the resistance covered, as produced by a mold. In this subclass impregnating is considered to constitute a coating.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
 244, for resistors whose element is in insulation with an outer metallic sheath, the insulation being coated on a conducting liner.  
 257, for a incased, embedded or housed resistor, whose casing or housing is formed in plural layers external to the resistance element, one layer being formed as a coating.  
 269, and 275, for a resistor, with a casing or housing formed and hardened on the resistance element, such as molded. See also (1) Note above.  
 308+, for resistors generally whose elements are coated on a base.
- SEE OR SEARCH CLASS:  
 29, Metal Working, subclasses 613+ for methods of enveloping or housing resistors including metal working or assembly steps not otherwise classifiable together with a coating step; and subclasses 194+ for stock material of metal with a metallic coating.  
 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a plural layer product comprising a coating

or a base or substrate, and involving resistance material, note especially subclasses 411+ for a nonstructural plural layer product in which only compositions of the layers are claimed.

- 263** This subclass is indented under subclass 262. Subject matter including an elongated resistance element formed as two or more continuous closed coils or loops as a spiral, helix, or toroidal winding as defined in subclass 296.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 254, for a helical or wound flattened resistance element embedded between flat layers fastened together.
- 261, for helical or wound plural resistors.
- 268, for a helical or wound resistor including a sleeve engaging over the resistance element.
- 296+, for helical or wound resistors generally.

- 264** This subclass is indented under subclass 263. Subject matter wherein the resistance element is wound or coiled on a core, the surface of the core engaging the helix or winding over substantially the entire periphery of the core and over the entire axial length of the helix or winding as for example to reinforce or shape the helix or winding over its length.

- (1) Note. The manner of assembly of the element on the core is immaterial for classification in this subclass. Often the coating acts as an adhesive to secure the resistance element to the core.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 270, for incased, embedded, or housed helical or wound resistors generally whose elements are coiled on a core.
- 301, for resistors generally whose elements are coiled on a flat or ribbon base.
- 302+, for resistors generally whose elements are coiled on a cylindrical or prismatic core.

- 265** This subclass is indented under subclass 264. Subject matter, wherein the resistance terminals are located at one end of the core, or

wherein the resistor includes structure or is shaped to enable the leads to extend from the resistor at one end only of the core.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 63, for resistors with bifilar windings for reducing the inductance of the windings.
- 229, for incased, embedded, or housed resistors of the probe type.
- 240+, for resistors whose elements are in powdered insulation with an outer metallic sheath, the resistance terminals or leads being adjacent.
- 296, for helical or wound resistors whose elements are of a particular shape.
- 326, for resistors generally whose terminals are adjacent.

- 266** This subclass is indented under subclass 264. Subject matter wherein at least one of the resistance terminals surrounds the resistance element and/or the core, as a cap or an enclosing ring.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 30, for a resistor which is temperature responsive, whose terminal forms a casing or housing.
- 271, for a resistor whose terminal forms a casing or housing.
- 272, for a resistor whose terminal or lead surrounds and is secured to the casing or housing.
- 313, for resistors in general whose terminals embrace the base.

- 267** This subclass is indented under subclass 226. Subject matter, wherein the resistance element is elongated and formed as two or more continuous closed coils or loops as a spiral, helix, or toroidal winding as defined in subclass 296 below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 261, for plural resistors at least one being helical or wound.
- 263+, for a resistor which is helical or wound, and whose casing or housing is formed as a coating.

278, 282, 286, and 296+, for resistors generally involving a helical element.

**SEE OR SEARCH CLASS:**

336, Inductor Devices, subclasses 90+ for inductors with an outer casing or housing.

**268** This subclass is indented under subclass 267. Subject matter wherein the casing or housing constitutes a preformed sleeve which is disposed over the cylindrical helix or winding, the inner surface of the sleeve engaging the outer cylindrical surface of the helix or winding over the entire periphery, i.e., the bore of the sleeve is fitted to the helix or winding.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

229, for probe type, incased, embedded, or housed resistors.

256+, for a resistor whose element is surrounded by a plurality of layers, one or more of which may be a sleeve.

**269** This subclass is indented under subclass 267. Subject matter wherein the casing or housing surrounding the helical or wound element has been applied in a plastic formable state with substantially no intervening spaces between the casing or housing and the internal resistance structure, the casing or housing being hardened on the internal resistance structure.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

210+, for flexible or folding resistors.

248, and 250, for resistors whose element is in insulation with an outer metallic sheath, the insulation being formed and hardened in situ, e.g., molded.

275, for incased or housed resistors generally whose casing is formed and hardened on the resistor as by molding.

**SEE OR SEARCH CLASS:**

336, Inductor Devices, subclass 96 for potted induction devices.

**270** This subclass is indented under subclass 267. Subject matter wherein the resistance element is wound or coiled on a core, the surface of the core engaging the helix or winding over substantially the entire periphery of the core and

over the entire axial length of the helix or winding as, for example, to reinforce or shape the helix or winding over its length.

(1) Note. The manner of assembly of the element on the core is immaterial for classification in this subclass.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

264+, for a resistor whose element is coiled on a core, and with a casing or housing formed as a coating.

301, for resistors generally whose element is coiled on a flat or ribbon base.

302+, for resistors generally whose elements are coiled on a cylindrical or prismatic core.

**271** This subclass is indented under subclass 226. Subject matter wherein one or both of the resistance terminals constitute a casing or housing for the resistance element.

(1) Note. Usually in this subclass one of the terminals is formed as a sleeve which surrounds the resistance element, the other terminal making contact with the element within the sleeve.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

30, for a probe thermometer type resistor one of whose terminals forms a casing.

272, for a resistor whose terminals or leads surround and are secure to the casing or housing.

332, for a resistor whose terminal embraces or surrounds the resistance element.

**272** This subclass is indented under subclass 226. Subject matter wherein one or more of the resistance terminals or conductors connecting the resistance element or terminal to an external circuit surround the housing or casing and are also secured to the casing or housing.

(1) Note. Usually the subject matter of this subclass includes an elongated tubular casing with an elongated resistance element therein, the resistance terminals

being formed as caps on the ends of the casing.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 266, for helical or wound resistors whose casing is formed as a coating, the terminal surrounding the element and/or core.
- 313, for a resistor with a base extending along the resistance element, and with a terminal embracing the base.
- 332, for a resistor having a terminal embracing or surrounding the resistance element.

- 273** This subclass is indented under subclass 226. Subject matter wherein the casing or housing has an elongated shape, and the resistance terminal or the conductor connecting the resistance element or terminal with an external circuit extends into an end of the casing.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 276, for a resistor having a terminal or lead extending through the casing or housing wall.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclasses 74+ for conduit cables, and conductors with end structure.

- 274** This subclass is indented under subclass 273. Subject matter wherein distinct structure such as a disc, seal, or cap is provided between the casing and the terminal or lead conductor to seal any space existing therebetween.

- (1) Note. For classification in this subclass distinct sealing structure is necessary, as opposed to a mere tight fit or adhesion between the casing and the terminal or lead, which subject matter is classified in the generic subclass 273.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 233, for a resistor whose casing or housing is elongated in shape and has a plug disc or cap at the end for ready open-

ing of the casing and/or separation from the resistance element.

- 237, for resistors whose elements are hermetically sealed in spaced relation from their casings or housings.
- 269, and 275, for resistors with molded or fused casings and housings which may be directly sealed to the terminals.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclass 77 for conduit, cable, and conductor with sealing end structure.

- 275** This subclass is indented under subclass 226. Subject matter wherein the casing or housing has been applied to all or part of the remaining resistance structure in a plastic and formable state with substantially no intervening space between the casing or housing and the resistance structure, and then hardened in position.

- (1) Note. Usually there is some bonding or adhesion between the casing or housing and the resistance structure which the casing covers. The most common examples of the subject matter of this class are plastic or ceramic casings molded on the resistor, or glass fused to the resistor. The hardening need not be sufficient to render the casing entirely rigid for classification in this subclass.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 193, for mechanically variable resistors with an angularly movable contact, with an enclosure formed on and hardened on the resistance element.
- 210+, for flexible or folded resistors.
- 230, for resistors having a metal casing or housing cast around the element.
- 250, and 333, for resistors whose element is in insulation with an outer metallic sheath, the insulation being formed and hardened in situ, e.g., molded.
- 252, for resistors embedded or enclosed in a groove or recess with a filling hardened in situ.
- 262+, for resistors whose casing or housing is formed as a coating. See also (1) Note under subclass 262 for the dis-

- inction between a coating and the subject matter of this subclass (275).
- 269, for helical or wound resistors whose casing is formed on and hardened on the resistor, e.g., molded.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclass 98 for embedded conduit-ducts or conductors, and subclasses 110+ for insulated cables.

- 276** This subclass is indented under subclass 226. Subject matter wherein at least one resistance terminal or conductor connecting the resistance element or terminal to an external circuit extends through a wall of the casing to permit an electrical connection to be made externally to the resistance element.

- (1) Note. For classification here the terminal must extend through the casing wall. Where the resistance element extends through the wall classification is not in this subclass, but in the generic subclass 226.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 273+, for a resistor whose terminals extend into an end of the sheath.
- 312, for a resistor with a base, the terminal extending through the base.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclass 18 and 65 for boxes and housings with openings for passing conduit or cable, and subclasses 151+ for insulators for insulating a conductor extending through a wall or plate.

- 277** This subclass is indented under the class definition. Subject matter wherein the resistor includes mechanical protecting structure such as a guard, screen, or mechanical shield which is secured to the remaining resistor structure and is spaced from the resistance elements and/or terminals.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 57, for resistors with vented or ventilating casings or housings.

- 64+, for resistors with electrical shields.
- 226+, for incased, embedded, or housed resistors, the casing or housing forming a protecting structure.
- 311, for a resistor whose element is mounted in a groove in the base.
- 334, for resistors with heat shielding structure, not otherwise classifiable.

**SEE OR SEARCH CLASS:**

- 174, Electricity: Conductors and Insulators, subclass 5 for miscellaneous electric shock hazard protecting devices. See also the Notes under this subclass for an extended field of search for this subject matter.

- 278** This subclass is indented under the class definition. Subject matter wherein a flat ribbon or strip-like resistance element is coiled or otherwise formed as a flat or cylindrical helix with the narrow edges of the resistance element forming the outer and inner boundary surfaces of the helix, the wider flat surfaces of the resistance elements extending transverse to the helix.

- (1) Note. The subject matter of this subclass is most commonly a cylindrical core with helically disposed grooves therein, and a ribbon resistance element having an edge extending in the groove. In this subclass the resistance element in a strip with ribbon-like characteristics. However, the element is bent or curved edge-wise as opposed to the common flatwise bend occurring in the subject matter of subclasses 279+ below.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 58, for a resistor including a ventilated helical element.
- 261, 263 and 267+, for incased, embedded or housed helical or wound resistors.
- 282, for a resistor whose element is a helix formed from a bent ribbon. See also (1) Note above.
- 296+, for helical or wound resistors, generally.
- 333, for resistors of a particular configuration not otherwise classified.

- 279** This subclass is indented under the class definition. Subject matter wherein the resistance element constitutes an elongated continuous flat ribbon, strip, or tape of uniform cross-sectional dimensions and integral over its length between terminals, the element being bent or curved along its flat sides between terminals into a particular configuration while retaining the ribbon-like characteristic.
- (1) Note. In this subclass the flat portion of the ribbon is bent or curved. The bend on the flat sides may be transverse or oblique to the length of ribbon. An edgewise bend or curve as may occur in an edgewise wound helix in a zigzag grid resistance element is not classified here, but in such subclasses as 278 and 283+.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 208, for mesh, woven, or braided resistors.  
 212, for flexible or folding tape resistors.  
 278, for a resistor whose element is helical and formed as an edgewise coiled strip. See also (1) Note above and under subclass 278.  
 297, for a resistor whose element is a flat helix or winding.  
 301, for a resistor whose element is coiled on a flat or ribbon base.
- SEE OR SEARCH CLASS:
- 174, Electricity: Conductors and Insulators, subclass 133 for noncircular strand section conductor structure.  
 336, Inductor Devices, subclass 223 for inductor winding of a noncircular section.
- 280** This subclass is indented under subclass 279. Subject matter wherein the flat ribbon or strip resistance element is bent or curved into a zigzag or sinusoid.
- (1) Note. See the definition of subclass 283 for the definition of a zigzag or sinuous resistance element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 58, for ventilated zigzag type resistors.
- 283+, for zigzag or sinuous resistors generally.
- 281** This subclass is indented under subclass 280. Subject matter wherein the ribbon or strip resistance element includes integral structure, which may be a particular shape such as a rib or channel, to reduce any tendency of the ribbon or strip to bend.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 284, for a zigzag or sinuous resistor whose element includes integral stiffening structure.  
 291, for such a resistor which includes a transverse element stiffening or reinforcing rod or strip.  
 333, for resistors of a particular configuration not classified above.
- 282** This subclass is indented under subclass 279. Subject matter wherein the flat ribbon or strip resistance element is bent or curved into a helical or spiral configuration.
- (1) Note. See the definition of subclasses 296+ for the definition of a helical or spiral element.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 58, for ventilated helical resistors.  
 62+, for noninductively wound resistance elements.  
 68+, and particularly subclasses 117, 141 and 143+, for mechanically adjustable or variable resistors including a helical ribbon resistance element.  
 207, for a resistor whose element and base are folded or rolled.  
 218, for wire wound tapered resistors.  
 261, 263 and 267+, for an incased, embedded or housed resistor whose element is helical or wound.  
 296+, for helical or wound resistors generally.
- 283** This subclass is indented under the class definition. Subject matter where the resistance element is composed of at least three elongated portions extending side by side and/or coextensive and electrically separate, the alternate adjacent ends being electrically connected by

being in contact or integral, or by resistive or conductive material to provide a series path through the elongated portions.

- (1) Note. The elongated portions need not be straight, but may be curved or zigzag. Further, if straight, the portions need not extend in parallel.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 51, for a resistor with a heat radiation type resistance element formed as a zigzag.  
 58, for ventilated zigzag type resistors.  
 114+, for a deformable variable resistor whose element has a zigzag shape.  
 226+, for incased, embedded, or housed zigzag or sinuous resistors.  
 280+, for zigzag or sinuous bent ribbon resistors.  
 295, for plural resistance elements generally connected by a jumper.  
 296+, for helical or wound resistors.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclasses 200+ for electric heaters of zigzag or sinuous shape, and subclass 540 for radiating plate heaters whose resistance elements may have a zigzag or sinuous shape.

- 284** This subclass is indented under subclass 283. Subject matter wherein the elongated portions of the zigzag or sinusoidal element include integral structure, which includes a particular shape, such as a rib or channel, to reduce any tendency of the elongated portion to bend.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 281, for zigzag resistors formed as a continuous bent ribbon of uniform cross-section and including a stiffening bend.  
 291, for a zigzag or sinuous resistor with a transverse element stiffening or reinforcing rod or strip.

- 285** This subclass is indented under subclass 283. Subject matter wherein the zigzag or sinuous element lies substantially over its entire length in a groove in a base forming a supporting structure.

- (1) Note. The resistance element may be coated on the walls of a zigzag or sinusoidal shaped groove.

- (2) Note. For classification in this subclass the zigzag or sinuous element must be disposed in the groove over substantially its entire length, as where the walls of the groove, i.e., the base, provide rigidity for the element. In subclass 290 below the element merely projects in or through an opening, which may be a groove, over a small portion of its length, as for supporting the element or suspending the element between spaced portions on a frame or other support.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 252+, for an incased resistor whose element is embedded in a groove in the casing.  
 290, for a zigzag or sinuous resistor whose element projects in or through an opening or slot in a supporting frame. See also (2) Note above.  
 303, for a helical or wound resistor whose element is disposed in a helical groove on the core.  
 311, for resistors generally having an element mounted in a groove in the base.  
 317, for resistors generally having an element projecting or threading through a support.

- 286** This subclass is indented under subclass 283. Subject matter wherein the resistor includes in the same part a helical pattern as well as the zigzag or sinuous pattern.

- (1) Note. The subject matter of this subclass usually includes a resistor whose element is a helical wire which is shaped into a larger overall zigzag or sinusoid, or whose element is a zigzag or sinusoidal wire which is shaped into a larger overall helix.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 48, for plural separate diverse resistors.  
 296+, for helical or wound type resistors.  
 333, for resistors generally of a particular configuration.



**287** This subclass is indented under subclass 283. Subject matter wherein the resistance element is shaped to provide two distinct zigzag patterns in the same portion of the resistance element.

- (1) Note. Usually the compound resistance element is formed by a series of zigzag grids disposed in parallel with alternate adjacent ends connected to form a second zigzag pattern, or a zigzag resistance element is bent to form a second zigzag pattern.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 286, for a resistor whose element is shaped to include in the same portion a helical and a zigzag or sinuous pattern.  
298, for compound helical or wound resistors.

**288** This subclass is indented under subclass 287. Subject matter wherein the resistance element includes three or more resistive strips substantially parallel or lying in substantially parallel planes, alternate adjacent ends of the strips being electrically connected in series by conductive material usually formed as a connecting wire, strip, or block, thus forming the strips into a zigzag or sinuous pattern.

- (1) Note. For classification in this subclass the jumper or spacer must be conductive at least to the extent of having a substantially lower resistivity than the resistive strips. Further, the jumpers or spacers must be distinct from the strips. Where the jumpers or spacers are integral with the strips or of the same material or resistivity as the strips, classification is in the generic subclass 287. Further, when no jumper or spacer is present, the strips directly contacting each other at their respective ends, classification is in subclass 287 above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 289, for zigzag or sinuous resistors generally whose elements are connected by conductive jumpers or spacers.

- 295, for plural resistance elements generally connected by a jumper or spacer.

**289** This subclass is indented under subclass 283. Subject matter wherein the resistive element includes three or more elongated resistive portions which are substantially parallel, alternate adjacent ends of the portions being electrically connected in series by conductive material usually formed as a connecting wire strip or block, thus forming a zigzag or sinuous pattern.

- (1) Note. For classification in this subclass the jumper or spacer must be conductive, at least to the extent of having a substantially lower resistivity than the resistive portions. Further, the jumpers or spacers must be distinct from the resistive portions. Where the jumpers or spacers are integral with the resistive portions or of the same material or resistivity, classification is in the generic subclasses 283+. Further, when no jumper or spacer is present, the strips directly contacting each other at their respective ends classification is in subclasses 283+ above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 288, for compound or multiple zigzag resistors one of whose zigzag patterns is formed by jumpers or spacers connecting elongated resistance elements, which are parallel or in parallel planes.  
295, for plural resistors generally which form a unitary structure and are connected in series by conductive jumpers or spacers.

**290** This subclass is indented under subclass 283. Subject matter wherein the resistance element is disposed for a part (substantially less than all) of its length in a slot, notch, or other opening in the frame or support, the frame or support directly engaging the element over a portion of its length, usually for the purpose of positioning the element on the frame or support.

- (1) Note. In this subclass the element is disposed in a notch or slot for a small part of its length where it passes through the frame or support for supporting pur-

poses. While in subclass 284 above the element lies in a groove in a base over substantially its entire length, usually for the purpose of imparting rigidity to the element.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 58, for ventilated zigzag type resistors.
- 252, for a resistor whose element is embedded in a groove in the casing.
- 285, for a zigzag or sinuous type resistor whose element extends along a groove for substantially the entire length of the element. See also (1) Note above.
- 303, for a helical or wound resistor whose element is disposed in an opening or groove in a frame or support.
- 310, for resistors generally whose elements extend through a base.
- 317, for resistors generally whose elements extend through a support.

**291** This subclass is indented under subclass 283. Subject matter wherein a rod or strip extends transversely to the elongated portions of the zigzag or sinusoidal element and engages these portions to prevent the portions bending with respect to one another thus providing a reinforcement or stiffening to the zigzag or sinusoidal element as a whole, the rod or strip being of insulating material or being insulated from the elongated portions to avoid short circuiting between the portions.

- (1) Note. The subject matter of this subclass includes structure which merely insulatingly connects the elongated portions to prevent relative motion. Where the zigzag or sinusoidal element or parts thereof are supported with respect to other objects classification is in subclass 283 and other indented subclasses thereunder.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 208, for mesh, woven, or braided resistors.
- 226, for incased, embedded, or housed zigzag or sinuous resistors.
- 281, for a zigzag or sinuous resistor formed as a continuous bent ribbon with a stiffening bend.

- 284, for a sinuous or zigzag resistor whose element includes integral stiffening structure.
- 285, for a sinuous or zigzag resistor whose element lies in a groove in a base.
- 287+, for compound or multiple zigzag resistors whose elements are joined by structure such as rods or strips which may stiffen or reinforce as well as support the elements.
- 290, for a zigzag or sinuous resistor whose element extends through an opening or slot in a support or frame, the supporting or frame structure around the opening or slot providing a possible stiffening or reinforcement for the element as well as a support.
- 306, for resistors generally having a base extending along the resistance element.

**292** This subclass is indented under subclass 283. Subject matter wherein the resistance element is formed as a coating on a base.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 300, for a helical resistor whose element forms a coating.
- 308+, for a resistance whose element is coated on a base. See also the Search Notes under this subclass.

**293** This subclass is indented under subclass 283. Subject matter wherein the resistance element is flat in one dimension to lie substantially in one plane.

- (1) Note. A resistance element having a flat surface is not necessarily classified in the subclass. For classification here the overall shape must be flat or planar.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 212, for flexible or folding resistors formed as a sheet.
- 254, for a resistor whose flattened element is embedded between flat layers.
- 279+, for resistors formed as bent ribbons.
- 287+, for a compound or multiple zigzag type resistor whose element has a planar shape.

- 293, for zigzag or sinuous resistors whose elements extend through openings or slots in a support or frame and are planar.
- 314, for a resistor whose element and base are formed in layers.
- 333, for resistors of a particular configuration not classified above.
- 294** This subclass is indented under subclass 283. Subject matter wherein the zigzag or sinuous resistance element lies in or is formed as a cylindrical surface of revolution.
- (1) Note. The elongated portions of the resistance element may form elements of a cylinder or be circular to lie in the cylindrical surface of revolution.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 162+, and 190+, for mechanically variable resistors with an angularly movable contact arm whose resistance element is formed as a cylindrical zigzag or sinusoid.
- 207, for a resistor whose element and base are folded or rolled.
- 286, for a compound or multiple zigzag resistor including a helical pattern.
- 287+, for compound or multiple zigzag resistors generally.
- 296+, for helical or wound resistors generally.
- 295** This subclass is indented under the class definition. Subject matter wherein a plurality of resistors as there defined have their elements connected at one of the respective ends, by a separate and distinct conductor, the resistance elements being close together and physically supported to form a unitary resistance structure.
- (1) Note. The conductor must be of appreciable length. Two resistors whose elements are in physical contact to produce a galvanic connection therebetween are not classified here, but in subclasses 319 or 320, if supported to form a unitary structure. The connection should have a conductivity appreciably greater than the resistance element. A mere plurality of resistors connected electrically in some circuit arrangement is not classified here, but in such Classes as 323, Electricity: Power Supply or Regulation Systems, and 333, Wave Transmission Lines and Networks. The plurality of resistors should in themselves be closely arranged to form a resistive unitary structure for classification here.
- (2) Note. Where three or more elongated resistance elements are arranged side by side in parallel with alternate ends connected by a conducting spacer or jumper to form a zigzag resistor classification is in subclass 289, or in subclass 288, if the zigzag so formed is one zigzag of a compound or multiple zigzag resistor.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 48, for plural separate diverse resistors which may be connected by a jumper.
- 128+, for plural mechanically variable resistors which may be connected by a jumper.
- 279+, for resistors whose elements are formed as a bent ribbon.
- 288, for compound or multiple zigzag or sinuous shaped resistors whose elements are connected by a conductive jumper or spacer. See also (2) Note above.
- 289, for zigzag or sinuous shaped resistors generally whose elements are connected by a conductive jumper or spacer. See also (2) Note above.
- 319, 320, for plural resistors which are supported to form a unitary structure. See also (1) Note above.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclass 462.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) having plural heating elements gapped from an underside of the support surface (e.g., ceramic plate, radiation type, etc.).
- 323, Electricity: Power Supply or Regulation Systems, subclass 218 and 297 for phase control and output control respectively, which include a plurality of impedances, which may be resis-

- tors, connected together. See also (1) Note above.
- 333, Wave Transmission Lines and Networks, subclass 81 for attenuators. See also (1) Note above.
- 296** This subclass is indented under the class definition. Subject matter wherein an elongated resistance element is formed as two or more continuous closed coils or loops as a spiral, helix, or toroidal winding.
- (1) Note. In the subject matter of this and the indented subclasses the coils are substantially closed, any opening being for continuing the resistance element to the next turn. In zigzag or sinuous resistors in subclasses 283+ above, the loops are open at one end, and may in addition include sharp changes in the direction of the elongated resistance elements. While the helical or wound resistors in this subclass may be flattened, there is an appreciable thickness, as opposed to the zigzag or sinuous type in subclasses 283+ above, where the element may lie substantially in one plane or all portions of the element substantially coincide along the longitudinal axis of zigzag or sinusoid.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 58, for ventilated helical resistors.
- 62+, for resistors with helical or wound elements with inductance reducing means.
- 68+, for mechanically variable resistors which may include a helical winding.
- 207, for a resistor whose element and/or base is permanently folded or rolled.
- 208+, for mesh, woven, or braided resistors.
- 214, for cable type resistors which may include a helical resistance element.
- 218, for helical or wound tapered resistors.
- 263+, and 267+, for helical or wound resistors which are embedded, incased, or housed.
- 278, for resistors with edgewise coiled helical strip resistance elements.
- 282, for helical or wound resistors formed as a bent ribbon.
- 283+, for zigzag or sinuous shaped resistors; and especially subclass 286 for such resistors including a helical winding pattern. See also (1) Note above.
- 321, for cores and frames for helical or wound resistors.
- SEE OR SEARCH CLASS:
- 29, Metal Working, subclasses 610.1+ for methods of making helical or wound resistors involving metal working and assembly, and subclass 618 for such methods with winding together with enveloping or housing.
- 174, Electricity: Conductors and Insulators, subclass 138 for insulators, per se, upon which a resistor may be wound.
- 242, Winding, Tensioning, or Guiding, subclasses 430+ for a process or apparatus for forming an article by winding material onto a core.
- 336, Inductor Devices, appropriate subclasses for inductor devices which may be helical or wound.
- 428, Stock Material or Miscellaneous Articles, subclass 592 for metallic stock either in the form of a helix or having a helical component.
- 297** This subclass is indented under subclass 296. Subject matter wherein the resistance element is formed as a flat spiral lying in one plane.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 147, for contact following helical resistors, whose elements are formed as a flat spiral.
- 293+, for zigzag or sinuous resistors whose elements lie in one plane.
- 301, for helical or wound resistors whose elements are coiled on a flat or ribbon base.
- SEE OR SEARCH CLASS:
- 219, Electric Heating, subclass 540 for radiating plate electric heaters.
- 336, Inductor Devices, subclass 232 for planar type inductance coils.
- 298** This subclass is indented under subclass 296. Subject matter wherein the resistance element is formed in two or more distinct helical or winding patterns, as a coiled wire resistance

element being, in turn, helically wound on a cylindrical form.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 287+, for compound or multiple zigzag resistors, and especially subclass 286, where one of the winding patterns is helical.
- 297, for compound helically wound resistors, where one of the winding patterns is flattened.
- 299, for resistors formed with plural supported helices or windings.

**299** This subclass is indented under subclass 296. Subject matter including a plurality of helical or wound distinct resistance elements together with the necessary supporting structure to establish a fixed physical relationship between the elements as opposed to a mere electrical connection.

- (1) Note. Two distinct windings electrically connected and on a common core are classifiable in this subclass. However, a mere plurality of electrically connected layers, one layer being wound on the layer beneath; or two electrically connected windings whose wires parallel one another; or a bifilar winding are not sufficient to constitute plural windings for classification in this subclass. See subclass 296 and other indented subclasses thereunder for this subject matter.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 62, for plural resistance helices or windings related to reduce or eliminate any inductance existing in the helices or windings.
- 68+, for mechanically variable resistors which may include a plurality of helical or wound resistance elements.
- 208+, for mesh, woven, or braided resistors.
- 218, for wire wound tapered resistors.
- 261, for plural embedded, incased, or housed helical or wound resistors.
- 295, for plural resistors connected by a jumper.
- 298, for compound helical or wound resistors.

- 319, and 320, for plural resistors generally with a mounting or supporting means. See also the Search Notes under subclass 315 for a field of search for resistors with mounting or supporting means.

**SEE OR SEARCH CLASS:**

- 242, Winding, Tensioning, or Guiding, subclasses 430+ for a process or apparatus for forming an article by winding material onto a core; particularly subclasses 439.5+, 440.1, 444+, and 445.1 for applying plural windings upon a core sequentially or simultaneously (e.g., to make a resistance element).
- 336, Inductor Devices, especially subclasses 65+, 115+, 170+, and 180+ for plural inductor coils.

**300** This subclass is indented under subclass 296. Subject matter wherein the helical resistance element constitutes a helical coating on an insulating base or support.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 195, for resistors which may be varied or adjusted by removing and/or adding material, the resistance element being formed as a coating.
- 292, for zigzag or sinuous shaped resistors whose elements form coatings.
- 308+, for resistors generally whose elements are formed as a coating on a base. See also the Search Notes under subclass 308.

**SEE OR SEARCH CLASS:**

- 336, Inductor Devices, subclass 200 for inductor coil structure comprising a printed conductive coating on a base.
- 428, Stock Material or Miscellaneous Articles, subclasses 195+ for a plural layer product having a nonuniform coating, impregnation or bond which may be helical in pattern and subclass 222 for a plural component product in which one of the components may be helical, and in which the products above may involve resistance materials.

**301** This subclass is indented under subclass 296. Subject matter wherein the resistance element is wound or coiled around a base which is flat or ribbon shaped, the coils of the winding engaging the flat surfaces as well as the edge surfaces of the base over the entire length of the coil to result in a flattened winding having a shape similar to the cross-sectional shape of the base.

- (1) Note. For classification here the winding must be around the base and be flattened to the base. Where the helical element passes through openings in the base to result in the base surrounding the element and/or where the element is separated from the sides of the base to retain a circular cross section, classification is in subclasses 304+ below. Likewise a flattened winding on a base other than flat or ribbon like, as being wound on two spaced parallel struts, is not classified here, but in subclasses 304+ below.
- (2) Note. The manner of applying the element to the base is immaterial for classification in this subclass. The element may be preformed as a coil and applied to the base.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 212, for flexible or folding tape resistors.
- 279+, for a resistor whose element is formed as a bent ribbon.
- 296, for helical or wound resistors generally of a particular shape.
- 297, for planar helical or winding type resistors.

**302** This subclass is indented under subclass 296. Subject matter wherein the resistance element is wound or coiled on a cylindrical or prismatic core, the surface of the core engaging the helix over substantially the entire periphery of the core and over the entire axial length of the helix or winding as, for example, to reinforce or shape the helix over its length.

- (1) Note. For classification in this subclass, the winding must be in contact with the cylindrical or prismatic core over substantially the entire length of the winding

as opposed to mere engagement at points or elements of the core, in which latter case classification is in subclasses 304+ below.

- (2) Note. The manner of assembly of the element on the core is immaterial for classification in this subclass. The element may be preformed as a coil, and applied to the core.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 214, for a cable type resistor whose element may be helical.
- 218, for a tapered resistor as where the element is wound on a tapered core.
- 261, 264+ and 270, for incased, embedded, or housed resistance elements coiled on a core.
- 298, for a resistor whose element is wound on a core, the element being formed as a compound helix.
- 299, for resistors whose elements are formed as a plurality of distinct helices or windings on a core.
- 300, for a resistor whose element is formed as a coated helix on a core.
- 301, for a resistor where the core is formed as a flat base or ribbon.
- 304+, for a resistor whose element is wound or otherwise disposed on a frame or support, there being only an engagement between the element and the frame or support over a portion of the length of the element. See also (1) Note above.

SEE OR SEARCH CLASS:

- 219, Electric Heating, particularly subclass 543 and 546+ for electrical heaters, wherein the heating element is wound on a core.
- 242, Winding, Tensioning, or Guiding, subclasses 430+ for a process or apparatus for forming an article (e.g., a resistor) by winding material onto a core.
- 336, Inductor Devices, especially subclasses 130+, 172, 196+, and 221, for inductor devices involving a coil wound on a core.

- 303** This subclass is indented under subclass 302. Subject matter wherein the core is provided with a helical groove in its surface, the resistance element being disposed in the groove with the convolutions of the element lying along the helical path of the groove.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 252, for an incased, embedded, or housed resistor whose element is embedded in a groove in the casing.
- 285, for a zigzag or sinuous shaped resistor whose element lies in a groove in the base.
- 305, for a helical or wound resistor whose element extends in or through a groove or opening in a frame or support.
- 311, for resistors in general whose elements are mounted in grooves in the base.

- 304** This subclass is indented under subclass 296. Subject matter wherein the helical resistance element is wound or otherwise disposed on a frame or support, the frame or support directly engaging the winding over a portion or portions of its length.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 58, for ventilated helical resistors.
- 197, for a mechanically variable resistor whose element may be helical, and with a support.
- 299, for plural supported helices or windings.
- 302, for a resistor whose element is wound or otherwise disposed on a cylindrical or prismatic core. See also (1) Note above.
- 306+, for a resistor whose base extends along the resistance element.
- 314+, for resistors generally with a supporting or mounting means.

- 305** This subclass is indented under subclass 304. Subject matter wherein the resistance element is wound or otherwise disposed in a notch, groove or other opening in the frame or support, usually for the purpose of positioning the element on the frame or support.

- (1) Note. The subject matter in this subclass usually involves a resistance element wound in notches on the surface of a supporting frame, or a helical resistance element extending through an opening in each of a series of supporting portions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 252, for an incased, embedded, or housed resistor whose element is embedded in a groove in the casing.
- 290, for a zigzag or sinuous type resistor whose element extends through openings or slots in a supporting frame.
- 303, for a helical or wound resistor whose element is wound in a groove on a cylindrical or prismatic core.
- 310, for resistors generally whose elements extend through a base.
- 317, for resistors generally whose elements thread or project through supports.

- 306** This subclass is indented under the class definition. Subject matter including a resistance element, and a non-resistive element in close physical relationship therewith to impart a rigidity or reinforcing to the resistance element not otherwise present.

- (1) Note. Usually the resistance element is thin or flexible and extends along and in contact with the side of a base of insulating material, the base supplying the necessary rigidity. In the combination of an element and mounting means or a support as defined in subclasses 315+, the mounting means or support maintains the element as a whole, positioned with respect to other structure, as opposed to providing mere rigidity as in this subclasses (306+).

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 207, for a resistor whose element and base are permanently folded or rolled.
- 210+, for flexible or folding resistors.
- 226, for incased, embedded, or housed resistors which may include a base.
- 279+, for a resistor formed as a bent ribbon which may include a base.

- 283+, for a zigzag or sinuous shaped resistor which may include a base.
- 296+, for helical or wound resistors with a form for the helix or winding.

**SEE OR SEARCH CLASS:**

- 219, Electric Heating, subclass 461.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating element is gapped from an underside of the support surface (e.g., ceramic plate, radiation type, etc.) and has a supporting, retaining, or mounting means for heating element or subclass 467.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating unit is contacting a planar underside of the support surface (e.g., sheet metal, etc.) and has a supporting, retaining, or mounting means for a heating element.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses for a plural layer product which may involve a layer of resistance material and a layer of nonresistance material, see especially subclasses 457+ in which one of the layers is a metal.

- 307** This subclass is indented under subclass 306. Subject matter wherein the resistance and/or terminal is coated on the base in a particular pattern or mark as by stenciling, printing, stamping or drawing.

- (1) Note. In this subclass only a portion of the base is covered as by the pattern or line. While in coatings as defined in subclasses 308+ below the coating covers the base or a distinct part of the base without any particular shape or configuration.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 2+, for strain gauges of the deformable type whose resistance elements are formed as coatings having particular patterns or marks.
- 15+, for photoconductive resistors whose elements are formed as coatings having particular patterns or marks.

- 292, for a zigzag or sinuous shaped resistor whose element is coated on a base.
- 300, for a helical resistor whose element is coated on a base.
- 308, for resistors generally whose elements are coated on a base, and subclass 309 for such resistors where the terminal is also coated on the base.

**SEE OR SEARCH CLASS:**

- 336, Inductor Devices, subclass 200 for printed-circuit-type inductor coils.
- 361, Electricity: Electrical, Systems and Devices, 748+ for printed circuit board having diverse electrical components.

- 308** This subclass is indented under subclass 306. Subject matter wherein the resistance element is coated on the base, and covers the base or a distinct part of the base.

- (1) Note. For classification in this subclass, the resistor element must be recited as having special structure, e.g., details of the shape of the element and/or base, details of the terminal, or a relationship between the terminal and or base, etc. For a mere product, not having such structure, but exhibiting resistance properties, see Search Class note below.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 142, for mechanically adjustable resistors with coated tapered resistor elements and subclass 217 for coated tapered fixed resistors.
- 211, for a flexible resistor wherein the resistance material is coated on or impregnated in flexible material, such as a fabric.
- 258, for a resistor whose element is coated on the interior of a casing.
- 262+, for resistors whose casing or housing forms a coating.
- 283, for a zigzag or sinuous shaped resistance whose element constitutes a coating.
- 300, for a helical resistor whose element constitutes a coating.
- 307, for a resistor whose element is printed or marked on a base.



327, for a resistor whose terminals are coated on the element.

**SEE OR SEARCH CLASS:**

219, Electric Heating, subclass 522 for windows including transparent material with a resistance coating thereon for heating the window.

427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer product which may involve a layer of resistive material and a layer of nonresistive material and especially subclasses 195+ for a nonuniform coating on a base. See also (1) Note above.

**309** This subclass is indented under subclass 308. Subject matter wherein at least one of the terminals is coated on the resistance element and/or on the base.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

327, for a resistor at least one of whose terminals is coated on the element.

**SEE OR SEARCH CLASS:**

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer product which may involve a layer of resistance material and a layer of nonresistance material and especially subclasses 195+ for a nonuniform coating on a base. See also (1) Note in subclass 308, above.

**310** This subclass is indented under subclass 306. Subject matter wherein the resistance element extends through the base.

(1) Note. In this subclass only a portion of the element is surrounded by the base, i.e., the portion of the element that extends through the base. While for classification in subclasses 226+ as an embedded incased or housed resistance the element is substantially enclosed by the base.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

226+, for resistors generally which are embedded, incased, or housed. See also (1) Note above.

228, for resistors which thread or project through a support.

252, 285, 303, and 311, for a resistor whose element is disposed in a groove in the base or casing.

312, for resistors whose terminals extend through the base.

**311** This subclass is indented under subclass 306. Subject matter wherein the resistance element is positioned in a groove in the base.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

226+, for resistors which are incased, embedded, or housed; and particularly subclass 252, for resistors whose element is embedded in a groove in the casing.

285, for a zigzag or sinuous shaped resistor, whose element is disposed in a groove in the base.

303, for a helical or wound resistor, whose element is disposed in a groove in the base.

308+, for a resistor whose element is coated on the interior of a groove in the base.

310, for a resistor whose element extends through the base.

**312** This subclass is indented under subclass 306. Subject matter wherein the resistance terminal extends in or through the base.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

310, for a resistor whose resistance element extends through the base.

322, and 331, for a resistor whose terminals extend within the resistance element.

**313** This subclass is indented under subclass 306. Subject matter wherein the terminal extends substantially around an external surface of the base, as a cap or encircling ring.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 310, for a resistor whose element extends through the base.
- 312, for resistors whose terminals extend in or through the base, the base thus embracing the terminals.
- 331, for a resistor whose element surrounds a terminal.
- 332, for a resistor whose terminals surround the element.

**314** This subclass is indented under subclass 306. Subject matter wherein the resistance element and base are formed in flat layers or as plates and piled on one another to form a lamination.

- (1) Note. The layers may or may not be bonded together.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 101, and 115, for a mechanically variable resistor whose element is formed as a pile.
- 204+, for solid pile resistance elements.
- 254, for resistance elements embedded between layers.
- 307, for a resistor whose element is printed or marked on the base.
- 308+, for a resistor whose element is coated on the base.
- 328, for a resistor whose terminals and elements are disposed in flat layers.

**315** This subclass is indented under the class definition. Subject matter wherein the resistor is combined with structure that establishes and/or maintains its position or path of movement with reference to some other object, and not classified above or elsewhere.

- (1) Note. For classification here some significant details of the resistance must be claimed. Classes 211 and 248 below, provide for supports for resistances or for the nominal combination of a resistor with support details. Class 174, especially subclass 138, provides for insulators, which may also perform a supporting function. The subclasses above in this schedule include resistors combined with particular types of sup-

ports, not otherwise classifiable. See the subclasses under SEARCH THIS CLASS below, for such subject matter.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 16, for photoconductive resistors with vibration control.
- 50, for a resistor mounted on wheels or on a vehicle.
- 64, for resistors with electric and/or magnetic shielding.
- 67, for a resistor mounted on a diverse nonelectrical device.
- 98, for a mechanically variable resistor with vibration damping means; subclasses 164, 184 and 199 for such a resistor with a housing; and subclass 197 for such a resistor with a support.
- 219, for a resistor on a lamp socket or base
- 221, for detachable plug-in type resistors.
- 226+, for incased, embedded, or housed resistors.
- 290, for sinuous or zigzag resistors whose elements project through a slot or opening in a support or frame.
- 299, for a helical or wound resistor with a plurality of supported helices or windings; subclass 301 for such a resistor whose elements are wound on a flat or ribbon base; subclasses 302+ for such a resistor wound on a cylindrical or prismatic base; and subclasses 304+ for such a resistor on a frame or support generally.
- 306+, for a resistor whose element extends along a base.

SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, especially subclass 138 for insulators which may perform a supporting function. See also (1) Note above.
- 211, Supports: Racks, appropriate subclasses, for plural article supports. See also (1) Note above.
- 219, Electric Heating, subclass 461.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating element is gapped from an underside of the support surface (e.g., ceramic plate, radiation type, etc.) and has a particular

supporting, retaining or mounting means for a heating element, subclass 467.1 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating unit is contacting a planar underside of the support surface (e.g., sheet metal, etc.) and has a particular supporting, retaining, or mounting means for heating element, or subclass 468.2 for an exposed planar support surface for material to be heated (e.g., hot plate, etc.) where a heating element is in a groove on an underside of the support surface (e.g., cast metal plate, etc.).

248, Supports, appropriate subclasses, for single article supports. See also (1) Note above.

361, Electricity: Electrical, Systems and Devices, subclasses 627+ for distribution or control panel board having resistances.

**316** This subclass is indented under subclass 315. Subject matter wherein the support includes structure, such as a spring, which offsets the effect of expansion or contraction of the resistance element due, for example, to temperature change, and/or which permits the resistance element to freely expand or contract.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

7+, for resistors whose value varies to compensate for temperature variations.

SEE OR SEARCH CLASS:

248, Supports, subclasses 274.1+ for adjustable brackets.

**317** This subclass is indented under subclass 315. Subject matter wherein the resistance element passes through the support, the support substantially surrounding the resistance element and there being an appreciable portion of the resistance element on either side of the support.

(1) Note. The most common subject matter here is a resistor threading through apertures or notches in a series of supporting rings.

(2) Note. In this subclass the resistance element is disposed on both sides of the support. While for classification in subclass 318, it is only necessary that the resistance element be disposed on one side as when suspended between the supports.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

210+, for flexible resistors.

318+, for resistors suspended between supports. See also (2) Note above.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 40 for conductors with overhead supporting structure, and subclass 167 for an insulator with a conductor receiving aperture or an insulator of the bushing type.

248, Supports, subclasses 49+ for pipe or cable supports, subclasses 200+ for brackets, and subclasses 317+ for suspended supports.

**318** This subclass is indented under subclass 315. Subject matter including at least two supporting portions with a resistance element suspended between and supported by these two supporting portions.

(1) Note. Usually the resistance element is rigid and elongated in shape with terminals at the ends with metallic supports receiving the resistor by snap action, or the resistance element is strung between the supports.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

209, for extensible resistors.

210+, for flexible resistors which may be suspended between supports.

290, for a zigzag or sinuous shaped resistor whose element extends through a slot or opening in a supporting frame.

305, for a helical or wound resistor, whose element extends through an opening or groove in a supporting frame.

316, for resistance supports with structure which compensates for or permits

- resistance expansion and/or contraction.
- 317, for resistances which thread or project through a support.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, subclasses 40+ for overhead conductor structure, and subclasses 168+ for insulators with conductor holding means.
- 211, Supports: Racks, subclasses 119.01+ for clothesline type supports.
- 248, Supports, subclasses 58+ for suspended pipe or cable supports.

- 319** This subclass is indented under subclass 318. Subject matter wherein a plurality of resistors are suspended between the supporting portions either side by side or end to end, or wherein a plurality of resistors are suspended between a plurality of pairs of supporting portions.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 320, for plural resistors generally with a support.
- 322, for plural resistance elements in parallel between terminals.

- 320** This subclass is indented under subclass 315. Subject matter wherein a plurality of resistors are combined with structure that establishes and/or maintains their position or path of movement with reference to some other object or to one another.

- (1) Note. This is the residual subclass for plural resistors.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 14, for a resistor whose value is responsive to a plurality of conditions.
- 48, for plural separate diverse resistors.
- 76, 120, 122+, and 128+, for mechanically variable resistors which may involve a plurality of resistors with a support.
- 203, for structure readily separable into a plurality of resistors.
- 235, 239 and 260, for plural resistors which are embedded, incased, or housed.

- 287, for a compound or multiple zigzag or sinuous resistor with a support.
- 295, for plural resistance elements connected by a jumper.
- 299, for a plural helix or winding type resistor with a support.

## SEE OR SEARCH CLASS:

- 211, Supports: Racks, appropriate subclasses, for plural article supports.
- 361, Electricity: Electrical Systems and Devices, subclasses 627+ for distribution or control panel board having resistors.

- 321** This subclass is indented under the class definition. Subject matter including a base claimed, per se, usually of insulating material on which the resistance element may be wound or otherwise strung, and peculiarly adapted for this purpose and not classified elsewhere.

- (1) Note. For classification here the claimed subject matter must be limited to the base core or frame, and exclude the resistance element. The combination of the resistance element together with the base, core, or frame is classified in the pertinent subclasses above, a few of the more pertinent subclasses being given in the Search Notes below. As between this subclass 321, and the insulators of special application in subclass 138 of Class 174, this subclass (321) includes insulators which are constituent parts of the resistor, as to have a resistance element wound or strung thereon. However, an insulator for supporting a resistance wire at one point thereon, this wire being strung in space in the manner of an aerial electrical conductor is not classified here; but in Class 174, subclass 138. See also the Search Notes under subclass 138 of Class 174.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 283+, for resistors whose elements are strung on a base in zigzag or sinuous fashion.
- 296+, for resistors whose elements are wound or otherwise helically disposed on a core.

306+, for resistors whose element extends along a base.

315+, for resistors whose element is combined with a mounting or supporting means.

**SEE OR SEARCH CLASS:**

174, Electricity: Conductors and Insulators, especially subclass 138, for insulators of special application. See also (1) Note above.

242, Winding, Tensioning, or Guiding, subclasses 600+ and 118+ for a spool upon which a resistor may be wound, usually for temporary storage.

248, Supports, subclasses 49+ for cable supports, and subclasses 200+ for brackets.

373, Industrial Electric Heating Furnaces, subclasses 117+ for resistance elements and mountings for the same when peculiar to or combined with electric furnace structure or control for electric furnaces.

**322** This subclass is indented under the class definition. Subject matter including a resistance element and one or more terminals in physical and electrical contact with the element for connecting the resistance element in an electric circuit.

(1) Note. Since all resistors must include terminals in the sense that some structure is necessary to permit energization of the resistance element, the term "terminals" is sufficiently broad to include the free ends of the resistance element. Thus the terminal and resistance element may be integral with no sharp line of demarcation therebetween. Usually, however, the terminal is an appreciably better electrical conductor than the element. The patents in this subclass usually include those where a significant relationship exists between the resistance element and its terminals; or the combination of detailed resistance element structure and terminals not classified with any of the particular types of resistors above. The combination of a resistance element broadly together with detailed terminal structure where the terminal is for a separable connection with the associated circuit is classified in

Class 439, or in Class 174, where the terminal is for a permanent connection with the associated circuit. See the reference to Class 174 under section 6 of the Class Definition of Class 439. Since all resistors as stated above include terminals, the Search Notes below are directed only to where significant terminal structure or relationship may be found.

(2) Note. The combination of a resistance element by name only together with two terminals is classified here as a residual home. As between Classes 174 and 439 and this class (338) the combination of a resistance element broadly recited and a plurality of spaced terminals is classified in this class (338). As stated in (1) Note above, the combination of a resistance element broadly recited and a single terminal is classified in Classes 174 or 439.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

68+, for mechanically variable resistors with terminals, especially subclasses 118+, for such resistors with a movable contact electrically adjustable over the length of the resistance element.

220, for a resistor in a detachable electrical connector.

221, for resistors of the detachable plug type which may include particular terminal structure.

229, for a resistor in a probe.

271, for incased resistors whose terminals form the casing.

273+, for incased resistors whose terminals extend into the end of the casing.

276, for incased resistors whose terminals extend through the casing wall.

307+, for a resistor whose terminals are printed or marked on the base.

309, for resistors whose terminals are coated on the base.

312, for resistors whose terminals extend in or through the base.

313, for resistors whose terminals embrace the base.

## SEE OR SEARCH CLASS:

- 174, Electricity: Conductors and Insulators, particularly subclasses 19+, 74+ and 84+, for electrical terminations of the permanent connection type which may be applied to resistance structure. See also (1) Note above.
- 427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.
- 428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer product comprising one layer which may be a resistance element and at least one other layer which may be considered terminals, but without other structure limiting the product to use as an electric resistor.
- 439, Electrical Connectors, appropriate subclasses, for terminals of the separable type which may be applied to resistance structure. See also (1) Note above.

**323** This subclass is indented under subclass 322. Subject matter wherein the resistance element is elongated in shape with a terminal connected to the element intermediate the ends of the element, and/or wherein a third terminal is connected to the resistance element physically or electrically between the connection of two other terminals.

- (1) Note. The elongated element may be coiled or curved, the essential characteristic being a stretched out length appreciably greater than the thickness.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 185+, for tap type mechanically adjustable or variable resistors, and subclass 72 for such resistors in or on a lamp socket.
- 325, for resistors generally with three or more terminals.

**324** This subclass is indented under subclass 322. Subject matter wherein the resistor terminals are significantly different, as by each terminal with the associated resistance element being

classifiable in different subclasses under subclass 322.

- (1) Note. The different must be in the terminal structure itself or in the relationship between the terminal and the resistance element. A significant difference in the detachable connections on respective terminals, each with the necessary resistance structure being classifiable in subclass 322 below, is sufficient for classification in this subclass 324, the detachable connector being a part of the terminal. A significant difference exists when included in the claims. The inclusion of two significantly different detachable connectors on one terminal is not sufficient for classification in this subclass (324). For classification here the significantly different connectors must be on different resistance terminals.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 48, for plural separate diverse resistors.
- 66, for ignition interference suppression type resistors having diverse terminals.

**325** This subclass is indented under subclass 322. Subject matter wherein the resistance element has at least three distinct terminals connected thereto.

- (1) Note. The terminals must be connected to the resistance element at spaced points to provide a resistance path between the terminals for classification in this subclass. A mere plurality of detachable connectors on a terminal is not classifiable here, but in subclass 322 above.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

- 323, for resistors having three or more terminals one of which is tapped along the resistance element.

**326** This subclass is indented under subclass 322. Subject matter wherein the terminals are positioned relatively close to one another, i.e., the spacing between the terminals is small as compared to the length of the current path through

the resistor element, as by forming the resistor as a loop.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

240, for resistors whose elements are embedded in powdered insulation with an outer metallic sheath, the terminals being adjacent.

**327** This subclass is indented under subclass 322. Subject matter, wherein one of the terminals constitutes at least in part a coating on the resistance element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

244, 245, 257, and 262+, for resistors whose casings include a coating.

309, for a resistor including a base wherein the terminal and resistance element are coated on the base.

328, for resistors whose terminals and resistance elements are disposed in flat layers.

SEE OR SEARCH CLASS:

427, Coating Processes, subclasses 58+ for coating processes, per se, wherein the product has utility as an electrical article.

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer product comprising one layer which may be a resistance element and at least one other layer which may constitute a terminal, but without other structure limiting the product for use as an electrical resistor.

**328** This subclass is indented under subclass 322. Subject matter, wherein the terminals and resistance elements are formed in flat layers or as plates and piled on one another to form a lamination.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

49, for shunt type resistors.

101, and 115, for a mechanically adjustable or variable resistor whose resistance element is formed as a pile.

204+, for resistors generally whose elements are piled or stacked between terminals.

314, for a resistor whose element and base are formed in layers.

327, for resistors whose terminals are coated on the resistance element.

SEE OR SEARCH CLASS:

428, Stock Material or Miscellaneous Articles, appropriate subclasses, for a plural layer product, one layer of which may be resistive and another layer of which may be conductive, see especially subclasses 457+ in which one layer may be metal.

**329** This subclass is indented under subclass 322. Subject matter wherein at least one of the terminals is secured to the resistance element by welding or soldering.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

330, for resistors whose terminals are integral with the element as by sintering or impregnating.

**330** This subclass is indented under subclass 322. Subject matter wherein the resistance element and terminal are formed as an integral unit.

(1) Note. Examples of this subject matter other than welded, which are classified in subclass 329 above, are: when terminals and resistor unit are formed of the same material, but the terminals having a larger cross sectional area than the element; when the terminals are formed by impregnating the ends of the resistance element; and when the terminals are secured to the resistance unit by sintering.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

327, for resistors whose terminals are coated on the element.

329, for resistors whose terminals are soldered or welded to the element.

SEE OR SEARCH CLASS:

75, Specialized Metallurgical Processes, Compositions for Use Therein, Con-

solidated Metal Powder Compositions, and Loose Metal Particulate Mixtures, subclass 237 for a consolidated metal powder composition containing carbide and another nonmetal.

- 331** This subclass is indented under subclass 322. Subject matter wherein the resistance element surrounds at least part of one of the terminals, as by the terminal being embedded in the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 87+, for mechanically variable resistors wherein the penetration of the terminal within the resistance element may be adjusted.  
332, for resistors whose terminals embrace or surround the resistance element.

- 332** This subclass is indented under subclass 322. Subject matter wherein the terminal extends around an appreciable portion of the resistance element, as by a ring shaped terminal surrounding an end of the resistance element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 271, for resistors at least one of whose terminals forms a casing.  
313, for resistors whose terminals embrace the base.  
327, for resistors whose terminals are coated around the resistance element.

- 333** This subclass is indented under the class definition. Subject matter wherein the resistance element or base has a significant shape and/or physical dimension.

- (1) Note. The significant shape may be cross-sectional, such as in a tubular resistance.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 68+, for mechanically variable resistors whose resistance value may depend on shape, or wherein the variation is effected by a change in a dimension; especially subclass 71, for lamp socket type carbon compressible resistors; subclasses 99+, for com-

pressible type resistors generally; subclasses 114+, for deformable resistors; subclasses 118+, for resistors whose effective length may be varied; and subclasses 138+, for adjustable tapered resistors.

- 208, for mesh, woven, or braided resistors.  
209, for extensible resistors.  
210+, for flexible or folding resistors.  
217+, for tapered fixed resistors.  
279+, for a resistor whose element is formed as a ribbon bent or curved on its flat side.  
283+, for zigzag or sinuous shaped resistors.  
296+, for helical or wound resistors.  
308+, for resistors with coated elements of significant thickness.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 193+ for strips, rods, bars, or wires of significant shape.  
174, Electricity: Conductors and Insulators, subclass 138 for insulators of special application which may have a significant shape.  
373, Industrial Electric Heating Furnaces, subclass 134 for resistance furnaces wherein the resistance unit may have a particular shape.

- 334** This subclass is indented under the class definition. Subject matter which is not provided for in any of the preceding subclasses in this class.

SEE OR SEARCH CLASS:

- 29, Metal Working, subclasses 610.1+ for processes of assembling electrical resistors not otherwise classifiable.

END